IMPERIAL FOREST SCHOOL,

DEHRA DUN

BENGAL SECRETARIAT LIBRARY

CALENDAR.

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STAFF OF THE IMPERIAL FOREST SCHOOL, DEHRA DUN.

BENGAL SECRETARIAT LIBRARY

Board of Control.

The Inspector-General of Forests with the Government of India (*President*);
The Director of Public Instruction, N.-W. Provinces and Oudh;
The Director of the School;
Two or three Conservators of Forests (chosen yearly from different Provinces);
The Assistant Inspector-General of Forests (*Secretary*).

DIRECTOR.

J. S. Gamble, M.A., Oxford; Fellow of the Madras University; F.L.S.; Conservator of Forests, School Circle, N.-W. P. and Oudh, (*on leave*).

A. E. Wild, Conservator of Forests, (*offg. until Jan. 4, 1894*).

The Director is also *ex-officio* Fellow of the University of Allahabad, and member of the Civil Service Examination Board.

DEPUTY DIRECTOR.

A. Smythies, B.A., Cambridge; Deputy Conservator of Forests, N.-W. P. and Oudh.

INSTRUCTORS.

UPPER CLASS.

Natural Science, Botany, &c.,	A. F. Gradon, Dy. Conservator of Forests, Burma.
Surveying, Forest Engineering, &c.,	C. G. Rogers, F.C.H., Deputy Conservator of Forests, Bengal, L. P.

LOWER CLASS.

Babu UPENDRANATH KANJILAL, D.D.R.,* Extra Assistant Conservator, Assam.

Additional Instructors, not on the Permanent Staff.

Forest Law ...	N. HEARLE, Dy. Conservator of Forests, Dehra Dún Division.
Mathematics ...	A. P. GRENFELL, Assistant Conservator of Forests, Saháranpur Division.
Zoology	E. C. COTES, Assistant Superintendent, Indian Museum, Calcutta.
Systematic Botany ...	J. F. DUTHIE, B.A., Director of the Botanical Department, Northern India.
Physical Science ...	S. H. COLLINS, Assistant Agricultural Chemist to the Government of India.

Accounts and Procedure	Babu KASHESHWAR MOOKERJEE, Head Clerk, School Circle.
Science and Botany (Lower Class)	„ BIRBAL, Forest Ranger.
Mathematics (Lower Class)	„ GOPAL SINGH.

Store-keeper and Museum-keeper	Babu BIRBAL, Forest Ranger.
Accountant and Head Clerk	Pandit KRIPA RAM.
Hospital Assistant ...	GANGA SAHAI.

SCHOOL SITE AND BUILDINGS.

The Imperial Forest School, which was founded in 1878, is situated in Dehra Dún, in the North-Western Provinces. The School grounds lie to the south of the old Parade Ground and comprise the lands upon which the School buildings are erected, a vegetable and fruit garden and the Forest School Park or Arboretum.

The Buildings consist of:—

1. The main building containing—
   6 Lecture Rooms,
   Library,
   Museum Room,
   Herbarium,
   Offices of the Staff and those of the School Circle.
2. The Laboratory.
3. Quarters for 32 Students.
4. Carpenters' workshop and minor buildings.
5. Hospital.
6. Additional quarters capable of accomodating other 48 Students are under construction and will shortly be completed.

The School was instituted for the instruction of the members of the Provincial staff of the Forest Department in India. Students are of three classes:—Private Students, Government Students, and Students from Native States.

RULES TO REGULATE THE CONSTITUTION OF, ADMISSION TO, AND STUDIES AND DISCIPLINE AT, THE IMPERIAL FOREST SCHOOL, DEHRA DUN.

Section I.—Constitution and Studies.

1. The School is under the administrative control of the Inspector General of Forests, who is assisted by a Board consisting of—

1. The Inspector General of Forests, *President*;
2. The Director of Public Instruction, North-Western Provinces and Oudh;
3. The Director of the School;
4. One Conservator from each province (not more than three serving in any given year);

with, as *Secretary*, the Assistant Inspector General of Forests.

2. The Superior Staff of the School consists of—

1. The Director,
2. The Deputy-Director,
3. & 4. Two Instructors,
5. The Vernacular Instructor,

} assisted by the Forest Officers of the School Circle, North-Western Provinces.

The Conservator of Forests, School Circle, North-Western Provinces, will ordinarily be Director of the School. The Deputy-Director and two Instructors are officers of the Indian Forest Service on the Imperial List. The Vernacular Instructor is an officer of the Provincial Forest Service, also on the Imperial List.

3. The Director of the School is charged with (1) the general administration of the institution, including the regulation of the course of study under the arrangements prescribed by the Board of Control, subject to the sanction of the Government of India; (2) the supervision of the School buildings, quarters, and gardens; (3) the control of the accounts, and the conduct of correspondence.

4. *Courses.*—There are two courses; one in English, the other in the Hindustani language. Each course lasts 21 months. The English course is that followed by the "Upper Class"; the Hindustani course, that followed by the "Lower Class." The first

year's students are called "Juniors"; the second year's students, "Seniors." In the English course, students are prepared for the certificate in Forestry by the "Higher Standard"; in the Hindustani course, for that by the "Lower Standard."

The subjects taught in these courses are the following, described in the School syllabuses:—

1. Forestry, including Sylviculture, Utilisation and Forest Working-Plans; both theoretical and practical.
2. Mathematics—elementary Arithmetic, Algebra, Trigonometry, and Mechanics; in their application to forest questions.
3. Physical Science, including Chemistry, Physics, Physiography, Geology, Mineralogy and Soils.
4. Botany, both theoretical and practical; including the collection and preservation of plants.
5. Zoology—the classification of animals and the study of useful and dangerous species, especially of insects; including the collection and preservation of specimens.
6. Drawing, Surveying and Estimating; as required for forest officers.
7. Forest Engineering, theoretical and practical.
8. Forest Law, the elements of Criminal Law, and departmental organisation.
9. Forest Accounts and Procedure.

5. *Terms.*—The terms of study are as follows:—

1st year—
- Rains term—July 1st to October 31st, in Dehra Dún.
- Winter term—November 1st to December 22nd, in camp.
- Vacation—December 23rd to January 5th.
- Spring term—January 6th to March 31st, in camp.
- Hill tour term—April 1st to May 31st, in camp.
- Vacation—June 1st to 30th.

2nd year—
- Rains term—July 1st to October 31st, in Dehra Dún.
- Winter term—November 1st to December 22nd, in camp.
- Vacation—December 23rd to January 5th.
- Spring term—January 6th to February 15th, in camp.
- Examinations, including survey test—February 16th to March 31st.

6. *Examinations.*—The School Examinations are:—

1. Monthly, to test progress and application.
2. Final.

The *Monthly Examinations* are usually held on the last two working days of each month, as the Director may order. The marks obtained at these examinations are counted for one-fourth of the aggregate at the Final.

The *Final Examinations* are held in March of the second year, and the marks then obtained count for three-fourths of the aggregate.

7. *Certificates.*—There are two certificates obtainable in each class, after the final examinations: a "pass" certificate and an

"honours" certificate. The former is granted to students who obtain over 50 per cent. of the aggregate marks allotted to all subjects, provided this includes 50 per cent. of the marks allowed for each of the subjects of Forestry, Botany, Surveying, and Engineering. The latter is granted to students who obtain over 75 per cent. of the aggregate marks allotted to all subjects, including over 50 per cent. in each individual subject. These certificates are only granted on the orders of the Board of Control, who have authority to exercise their discretion in doubtful cases.

8. *Prizes.*—The School medals are awarded by order of the Board of Control, but only if "honour" marks (75 per cent.) have been obtained. Other prizes, whether given by Government or other donors, are also awarded by the Board of Control.

9. Should any student, of the three categories enumerated in Rule 11, be unable (*a*) to appear at the final examinations, or, having appeared, (*b*) fail to pass those examinations, he will not be permitted to appear at any subsequent final examination, unless he follows a second time the whole course of instruction at the School, or at the discretion of the Director, the second year's course.

Section II.—Admission Rules.

10. The total number of students of each class who can be admitted into the School each year will be limited to such number as the Board of Control may decide, from time to time, can be accommodated in the School. The number of studentships to be allotted each year to the respective Provinces, as well as the number of nominations to be made by the Director, will, with due regard to the total prescribed by the Board of Control, be decided by the Director of the School before the 1st of January, after consultation with the Provincial authorities as to their requirements, and communicated to the Local Governments concerned.

A.—Upper Class.

11. There are three categories of students in the Upper Class—

(1) Private Students.
(2) Students already in the Government service.
(3) Students deputed by Native States.

12. *Private Students* comprise all those students who are at present without appointments in any Forest Service, and whose object it is, by becoming possessors of Forest School certificates, to obtain employment, either in the Forest Service of the Govern-

ment of India, or in that of a Native State or some other owner of forest-property.

(i) Candidates for admission to the Forest School as private students must not be less than 18 or more than 25 years of age, and their applications must be sent to a Conservator of Forests* through a Divisional Forest Officer of rank not below that of an Assistant Conservator of the 1st grade, or through a Collector or other district officer. Neither the Conservator, the Divisional Forest Officer, nor the Collector need belong to the forest circle or province in which the candidate seeks employment; but Divisional Forest Officers and Collectors may not forward to Conservators applications unsupported by the five certificates enumerated below, namely:—

(*a*) A certificate that the candidate is a "Native of India," within the meaning † assigned to those words by section 6 of 33 Vict., Chap. 3.

(*b*) A certificate of age.

(*c*) A health certificate in the form prescribed by article 61 of the Civil Service Regulations, signed by the Civil Surgeon of the district in which the said Divisional Forest Officer's or Collector's duties lie, and testifying to the candidate's sound constitution, good vision and hearing, and general physical fitness for a rough out-door life in the Forest Department.

(*d*) A certificate of respectability and good moral character from two or more persons whose social or official position can be accepted as a guarantee of reliableness.

* Conservator of Forests, Bengal Circle, at Darjeeling.
Conservator of Forests, Assam Circle, at Shillong.
Conservators of Forest, North-Western Provinces and Oudh—
School Circle, at Dehra Dún.
Central Circle, at Naini Tal.
Oudh Circle, at Naini Tal.
Conservators of Forests, Central Provinces—
Southern Circle, at Nagpur.
Northern Circle, at Jabalpur.
Conservator of Forests, Berar Circle, at Amraoti.
Conservator of Forests, Punjab Circle, at Lahore.
Conservators of Forests, Upper Burma—
Eastern Circle, at Mandalay.
Western Circle, at Mandalay.
Conservators of Forests, Lower Burma—
Pegu Circle, at Rangoon.
Tenasserim Circle, at Moulmein.
Conservators of Forests, Madras Presidency—
Northern Circle, at Waltair.
Central Circle, at Madras.
Southern Circle, at Coimbatore.

† "Native of India" means any person born and domiciled within the dominions of Her Majesty in India, or within the territories of Indian Princes tributary to or in alliance with Her Majesty, of parents habitually resident in India, and not established there for temporary purposes only. (Article 45, Civil Service Regulations).

(*e*) A certificate from an officer of the Educational Department, of a rank not less than that of a Deputy-Inspector of Schools or the Head-master of a High School under public management, to the effect that the candidate's education appears sufficiently good to give hopes of his being able to pass the entrance examination.

The last three certificates must bear date not further back than the 1st October of the year preceding that in which the candidate proposes to present himself at the entrance examination.

If any person, giving certificates as above under (*c*), (*d*), and (*e*), is in a position to mention anything more to the credit of the candidate than the certificates actually call for, he may do so.

(ii) Upon the receipt by the Conservator of any application in respect to which the preceding conditions shall have been observed, that officer may either accept or reject the application, without assigning any reason for so doing; or he may require the candidate to produce other or better certificates in person before him.

(iii) Conservators may, at their option, test the fitness of a candidate who desires to enter the service of Government by practical work in the forests.

(iv) Those candidates who have been approved by the Conservator will be permitted, under his recommendation, to appear at the next entrance examination for the Forest School held in his circle.

(v) The *Entrance Examination* is held early in March each year, on such date as may be fixed by the Director, both at the Imperial Forest School and at such centres as may be fixed from time to time by Local Governments, and under such officers, Educational, Revenue, Forest, or other, as may be appointed: provided that the date shall be communicated by the Director to Local Governments and Conservators on or before 1st January. The subjects of examination are:—

		Minima pass marks. Per cent.
1. English	Conversation	50
	Composition	33
2. Arithmetic		40
3. Algebra, up to and including quadratic equations ...		40
4. Elements of Euclid, books I to IV and book VI ...		25
5. Mensuration—lengths, areas and volumes, with examples		25

The examination papers on the above subjects will be forwarded by the Director, in sealed covers, to such officials as the Local Governments may direct, in the month preceding the examination.

(vi) A Local Government may lay down rules under which the number of candidates allotted, under Rule 10, to the Province for admission into the school, shall be selected from the number of passed candidates. In such rules due regard must be had to the place taken in the examination, but the Local Government shall not be debarred from preferring, for good and sufficient reasons, a passed candidate who may have taken a lower place in the list to one higher on the list; provided that the Director may, after inspection of the papers of the selected candidates, place before the Local Government an objection to the admission of any of such candidates on the ground that he is below the required standard.

(vii) The Local Government may, if it thinks fit, exempt from the entrance examination any candidate who is a Bachelor of Arts, or who has obtained a degree or diploma of about the same standard at any University in India or in the United Kingdom or in a British Colony, or at any educational institution to which the Government of India may extend the privilege: provided that such degree or diploma shall not give such candidate a preferential claim over any candidates who have passed the entrance examination and who may appear more eligible for the Forest Service.

(viii) Prior to the admission of a student, his parents or guardians must satisfy the Director that they are willing and able to defray the expenses of the student at the School. These expenses are estimated to be not less than Rs. 735 for each student living in native fashion, and Rs. 945 in the case of those living in European fashion (*vide* Rule 21). Of these sums, parents or guardians must deposit with the Director, before the course commences, a sum of Rs. 126 in the case of native students and Rs. 168 in the case of European students, to meet the initial cost of uniform, books, instruments, stationery, and camp-equipage (*vide* Rule 18), and, in addition, Rs. 50 as caution-money.

(ix) Local Governments may, on the recommendation of a Conservator or of the Director, and in exceptional cases, allow selected private students who have passed the entrance examination a monthly stipend, not exceeding Rs. 50, to assist them through the School course; provided that such selected private students previously execute an agreement binding themselves to serve the Local Government concerned (in the event of their obtaining the School certificate) for a period of not less than five years (*vide* Rule 17). Such monthly stipend may, in case of misconduct or unsatisfactory progress at the School, be reduced or altogether withdrawn at the discretion of the Director.

(x) The names of those private students who succeed in obtaining the School certificate will be entered by the Director in a register to be kept for that purpose, and the Conservators of those circles, in which the non-stipendiary private students may severally desire or be willing to serve, will be addressed by him with the view of obtaining appointments for such students. The Conservators concerned will, for this purpose, be furnished with the original certificates already referred to in clause (i) of this rule, the School certificates, and such other useful information, more especially regarding the physical qualifications of the students, as the Director may be in a position to furnish.

(xi) A list of private students, who may not succeed in obtaining appointments, will be forwarded by the Director to the Inspector General of Forests, who will circulate the list amongst Durbars, Conservators, and other persons likely to be in need of the services of trained forest officials.

(xii) The appointment to the service of Government of passed private students depends on the existence of vacancies in the various circles, and even a stipendiary student has no claim to such appointment.

13. *Candidates in the Government Service,* who may be deputed to the School will ordinarily be either—

(*a*) members of the Provincial Service (Forest Rangers) who desire to qualify themselves for further promotion in their own or to a higher class; or

(*b*) members of the Subordinate Service (Foresters and other subordinate officials) similarly desirous of qualifying for promotion.

(i) Forest Rangers may be deputed by Local Governments, provided the candidates are certified, by the Conservator under whom they are serving, to possess sufficient knowledge of English and general education and ability to enable them to profit by the course. Such officers may be above 25 years of age, and need not pass the entrance examination. While at the School they will draw the pay of their grade, and the travelling allowances to which they may be entitled under the Civil Service Regulations.

(ii) Officers of the Subordinate Service may be deputed by Local Governments, provided that—

(*a*) they have been in that service for not less than three years;

(*b*) they have passed the School entrance examination;

(*c*) they are under 25 years of age;

(*d*) they have executed the formal agreement referred to in Rule 17.

Such officers will, while at the School, draw the pay and travelling allowances of their grade in the service; provided that the total amount sanctioned to meet the cost of their training, inclusive of travelling expenses, shall not be less than Rs. 735 in the case of students living in the native style, and Rs. 945 in the case of students living in European fashion (*vide* Rule 21).

14. *Students deputed by Native States* may be admitted on the request of the State concerned; provided that—

(*a*) they have passed the entrance examination of the School;

(*b*) they have produced the certificates required for admission, specified in Rule 12 (i).

The Durbars of Native States sending students to the School shall, before the beginning of each term, or of each year if preferred, deposit with the Director a sum sufficient to meet the expenses of the students. This sum, for the whole course, must not be less than Rs. 735 for students living in native fashion, and Rs. 945 for those living in European fashion (*vide* Rule 21).

B.—Lower Class.

15. There are also three categories of students in the Lower Class—

(*a*) Private students.
(*b*) Students in Government service.
(*c*) Students deputed by Native States.

The rules for admission to the Lower Class are the same as those detailed in Rules 12, 13, and 14 for admission to the Upper Class, with the following exceptions:—

(i) Instead of the Entrance Examination, the candidate must furnish a certificate of having passed the Middle Class Examination in the North-Western Provinces and Oudh, or an equivalent standard in another province, as well as a certificate that he possesses a competent knowledge of Hindustani.

(ii) The cost of training will not be less than Rs. 588 (*vide* Rule 21) for the whole course of 21 months.

(iii) The required deposit will be Rs. 84, and the caution-money Rs. 25.

C.—General.

16. No student of European or Eurasian extraction, not already in the permanent employment of Government or of a Native State, shall be admitted into the Forest School if he is married; nor shall any such student, whether in the permanent employment of Government or of a Native State or not, marry whilst at the School or until he has joined a permanent appointment. A breach of this rule will render the student liable to dismissal from the School, or to forfeiture of any appointment in the Forest Service which may have been promised to him, or to which he may otherwise have a claim.

17. *Agreement and Security Bond.*—Officers of the Subordinate Service, deputed to the School by Local Governments under Rules 13 (ii) and 15, shall execute a formal agreement—the sureties for the fulfilment of which should be men of position and means—to continue in the Forest Service of the Local Government concerned for a period of not less than five years after passing out of the Forest School, and on such rates of pay as may be in accordance with the existing organisation of the Department. A breach of this condition will render the defaulter and his sureties liable for the refund of the entire cost of the student's education at the School. The agreement and security bond shall be in the appended forms, and must be executed before the student is admitted to the School. The agreement will be signed by the student and, if he is a minor, by his father or guardian also; the

bond by the student and two sureties. The amount of security to be taken will be—

		Rs.
For a Lower Class student	... ...	600
„ an Upper Class student	Native	700
	European	1,000

The agreement and security bond need not be stamped.

The same rule shall apply to private students who may be granted stipends under Rule 12 (ix), subject, however, to the proviso of Rule 12 (xii). Should any such student not be appointed to the Forest Service of Government at the end of his School course, his agreement and security-bond will be returned to him.

18. *Uniform, book, and camp allowances.*—The Director is authorised to make deductions from the pay of Forest Ranger students under Rule 13 (i), or of students of the Subordinate Service under Rules 13 (ii) and 15, or from the stipends of private students under Rules 12 (ix) and 15, to the following amounts:—

		Rs.		Rs.
Lower Class students ...		4	monthly, or	84 in all
Upper Class students	Native ...	6	„ „	126 „
	European	8	„ „	168 „

in order to meet the following items of initial expenditure, *viz*:—

	Upper Class.		Lower Class.
	Native.	European.	
	Rs.	Rs.	Rs.
Uniform and equipment	20	50	20
Books and instruments	60	60	24
Camp outfit	46	58	40
Total ...	126	168	84

The Director will charge off in his accounts such portions of the above as may be necessary from time to time to meet expenditure on the items mentioned, until the whole of the amounts are

exhausted, after which the student will be required to pay in cash for articles supplied.

19. *Travelling allowances of private students in receipt of stipends.*—Students holding stipends from Local Governments under Rule 12 (ix) are not entitled to travelling allowance; but, as the tours entail greater expenditure in some months than in others, the Director is authorised to make a further monthly deduction from their stipends, of Rs. 5 from Upper Class Native students and Rs. 7 from Upper Class European students, and to disburse the amounts in the following manner:—

	Native Students.	European Students.
	Rs.	Rs.
Monthly travelling allowances { November-May, 1st year / November-March, 2nd year }	4	8
Or for 12 months ...	48	96
Special additional allowance for hill tour	22	16
" " for Punjab tour	35	35
TOTAL ...	105	147

20. Should the Conservator of a Circle from which any Government student of the Subordinate Service is deputed to the School, under Rule 13 (ii), prefer it, he can, subject to the orders of his Government, authorise the Director to pay travelling allowance to such student at the rates given in Rule 19, instead of at the rates allowed by the Civil Service Regulations. And in the case of Lower Class Government students, deputed to the School under Rule 15, he may similarly authorise the payment of travelling allowance at the following rates, instead of the rates permissible under the Civil Service Regulations:—

	Rs.
Monthly travelling allowance @ Rs. 4	48
Special hill tour allowance	16
" Punjab tour allowance	20
TOTAL ...	84

which rates are equivalent to a permanent travelling allowance of Rs. 4 per month for the whole course.

21. *Estimated expense of training.*—It has been calculated that, in addition to the amounts specified in Rule 18 for cost of uniform, books, &c., and camp-equipment, and in Rules 19 and 20 for travelling, the minimum monthly subsistence money for students comes to Rs. 20, 24 and 30, respectively; so that the minimum pay and travelling allowances of Government students under Rule 13 (ii), and the minimum stipends for stipendiary students under Rule 12 (ix), should not be less than Rs. 35 and Rs. 45, respectively, nor should the minimum pay and travelling allowances of Lower Class students (Rule 15) be less than Rs. 28. Thus, the minimum cost of training will be as follows:—

	Lower Class.	Upper Class.	
		Native.	European.
	Rs.	Rs.	Rs.
Subsistence money	20	24	30
Uniform, books, and camp outfit ...	4	6	8
Travelling allowance	4	5	7
TOTAL PER MENSEM ...	28	35	45
Or for the 21 months of the course ...	588	735	945

The same amounts should be taken as minima in calculating the allowances to be deposited on account of students from Native States under Rules 14 and 15, or provided by parents and guardians for the cost of training of private students.

Section III.—Disciplinary Rules.

22. *Quarters.*—The Director will allot to students, on their arrival in Dehra, such quarters as may be available in the School buildings or in the houses rented by him for students' accommo-

dation. The School quarters are tenable during the whole period of the students' course, and the rent is Rs. 2 monthly for each student, or Rs. 4 for each room. Students for whom there is no accommodation in quarters or in houses rented by the Director, or who may prefer it, can, with the permission of the Director, reside in the town in lodgings selected by themselves; but in that case the Director will accept no responsibility for the rent.

All students, living in quarters or in the rented houses, are expected to abide by such orders as the Director may issue from time to time for the purpose of ensuring cleanliness and sanitation.

No dogs are allowed in quarters, nor may dogs or horses be brought inside the School grounds.

Breakages of furniture, &c., in the quarters or School buildings must be paid for by the students. Students are responsible for the acts of their servants.

23. *Uniform.*—All students must wear the School uniform, which consists of a suit of khaki drill with white-metal buttons, and a grey turban of prescribed pattern, for the hot weather, and of khaki serge with similar buttons for the cold weather and camp. Those students who become members of the Dehra Dún Mounted Rifles are, however, permitted to wear the undress uniform of the corps, which also consists of a suit of khaki drill, of pattern similar to that of the School. Students who are Volunteers will wear, as head-dress, a brown shikar hat while at the School, and the regular corps helmet when on parade. Native students may dispense with turbans, or wear other head-dress, only with the Director's special permission. Uniform must always be worn inside the School building. It must also be worn in the School grounds up to 5 P.M.

24. *Uniform and Camp Equipment.*—The uniform of members of the Dehra Dún Mounted Rifles may be obtained through the corps staff; that of other students through the Storekeeper of the School, on the Director's order. As camp equipment each student requires—

(1) A small tent, not larger than 10 feet × 8 feet.
(2) A camp bed.
(3) A small camp table.
(4) A camp chair or "morah."

These articles are made at the School and issued at cost price to students.

25. *Books and Instruments.*—The list of books and instruments required by each student will be published by the Director from time to time. The articles must be purchased from the Director, who endeavours to obtain them of the best quality procurable, consistent with cheapness. No article will, however, be issued by the Storekeeper, except (*a*) on order of the Director, or (*b*) on cash payment.

Copies of the Forest Acts and Forest Code, as also surveying instruments and herbarium presses, are issued on loan, and students using them will be responsible for their safe custody and return.

26. *Leave.*—During the course of instruction, no student may leave Dehra without the written order of the Director. Nor may students, while in camp, leave the camp head-quarters without the written order of the Deputy-Director or the Instructor in charge. Subsidiary rules regarding leave will be made by the Director from time to time.

27. *Holidays.*—During the rains term, Saturday will usually be observed as a holiday or devoted to excursions. In camp, it will ordinarily be a half-holiday. Such of the usual gazetted holidays as are allowed will be notified as such from time to time.

28. *Punishments.*—Students are liable to the following punishments:—

(1) Reprimand by the teacher in class.
(2) Reprimand by the Director or the Deputy-Director at any time.
(3) Reprimand before a meeting, convened by the Director, of not less than three School officers, one of whom must be either the Director or the Deputy-Director. The proceedings of the meeting will be reported to the Conservator or the Native State deputing the student, or to his parents or guardians if he is a private student; and, if the meeting so decides, a note of them will be made on his final certificate.
(4) The Director, acting with the consensus of the meeting referred to under (3), has power to inflict, in addition, a fine to the extent of one-third of the salary or allowances of the student for a period not exceeding three months.
(5) The Director, acting with the consensus of a full meeting of the School officers presided over by himself, has power to dismiss any student for misconduct; and a student thus dismissed cannot be re-admitted to the School. The Director may remand any student who, in his opinion, is not sufficiently promising.

29. *Monthly Reports.*—A progress report on the work of each student will be issued monthly by the Director. It will record the number of marks obtained by the student at the last monthly examination, his application to his duties, and his conduct generally. It will be sent, for Government students or

private students in receipt of stipends, to the Conservator of the Circle from which the student is deputed; for Native State students, to such person as the Durbar may direct; and for ordinary private students, to the parent or guardian concerned.

30. *Library.*—The books in the School Library are available for the use of students under such rules as the Director may make from time to time. Books of reference must be consulted in the library itself, and no books may be taken away except after application to the librarian and entry in a register.

31. *Museum.*—The Museum and Herbarium are also available for the use of students; but the objects in the museum may not be handled or removed without the express permission of the Director or the Deputy-Director. Permission to consult the herbarium may be obtained from the Director or the Deputy-Director, but the plants must be kept in their order as arranged, and no sheets removed or altered without permission.

32. *Athletic Sports.*—The gymnasium and the tennis-courts will be available for the use of students during all recreation hours on week-days. Cricket and football may be played on the old parade ground. Students are recommended to join the School Athletic Club, the subscription to which is Rs. 4 yearly, and half-rates for those who do not play all the games.

Forms of Agreement and Bond to be executed by students already in the service of, or in receipt of stipends from, Government, previous to entry into the Forest School, Dehra Dún.

Articles of Agreement made and entered into this day of 18 BETWEEN

of

of the first part

of

son of the said of the second part and the SECRETARY OF STATE FOR INDIA IN COUNCIL hereinafter referred to as the Secretary of State of the third part. Whereby each of the parties hereto so far as the covenants and conditions on his own part are to be observed and performed covenants with the other of them as follows:—

1. The said hereby of his own free will and consent and with the approbation and consent of the said testified by the execution by him of these presents agrees with and to the Secretary of State his successors in office and assigns that he the said shall well and faithfully pursue his studies at the Government Forest School, Dehra Dún, and qualify for the Forest Service of the Government of British India or of any Local Government.

2. The said shall after completing his studies at the said Forest School and if so required to do serve the Secretary of State his successors in office and assigns in the Forest Department of the Government of British India or of any Local Government for a period of not less than five years and shall during the whole of such period diligently and efficiently do all acts and discharge all duties which may be required to be done by him in his capacity as an officer of the said Department.

3. The Secretary of State his successors in office and assigns hereby engages to educate the said at the Dehra Dún Forest School in all matters relating to forest service forest works and forest administration that it may be deemed necessary by the Director of the said School to teach the said

4. The Secretary of State shall pay the said during the whole period of his stay at the said School at and after the rate of Rs. per month and thereafter while the said shall faithfully and diligently serve as an officer of the said Forest Department at and after the rate of not less than Rs. per month and the said shall be entitled to all the rights and privileges in respect of pay pension and promotion accorded to officers of the said Department for the time by the Rules and Regulations of the Department.

5. Lastly it is hereby agreed and declared that the Secretary of State his successors in office or assigns shall be at liberty to rescind this agreement on account of the negligence failure to attend to duty idleness or any insubordination or misconduct on the part of the said and to dismiss him from the said Forest School or the service of the said Department and the said shall not be entitled to any of the privileges hereby imposed on him but the said or shall thereupon refund to the Secretary of State his successors in office and assigns

the total cost including the monthly payments made to the said
while at the said School
incurred by the Secretary of State or his successors in office or assigns in respect of the education of the said
at the said School. IN WITNESS whereof the said parties to these presents have hereunto set their respective hands and seals the day and year first above written.

Know all men by these presents that we
of
(principal obligor)
of and
of
(sureties) are jointly and severally bound to the SECRETARY OF STATE FOR INDIA IN COUNCIL in the sum of Rs.
to be paid to the said Secretary of State his successors in office or assigns or his or their certain attorney or attorneys for which payment well and truly to be made we bind ourselves our heirs executors administrators and representatives and each of us binds himself his heirs executors administrators and representatives firmly by these presents sealed with our seals and dated this
day of 18 .

WHEREAS the Secretary of State for India in Council for himself and his successors in office and assigns has engaged to educate the said at the Dehra Dún Forest School in all matters relating to forest science forest works and forest administration that it may be deemed necessary by the Director of the said School to teach the said
and has also agreed to pay him during the whole period of his stay at the said School at and after the rate of
rupees per month and whereas the cost per annum of such education without any such allowance being included is estimated to be Rs. which shall be taken to be the actual cost for the purpose of these presents and whereas in consideration of such education and pay to be given to the said as aforesaid by the said Secretary of State and his successors in office and assigns the said has agreed with the said Secretary of State his successors in office and assigns that he will after completing his studies at the said School and if required to do so serve in the Forest Department of the Government of British India for a period of not less than five years during the whole of which time he will diligently and efficiently do all acts and discharge all duties which may be required of him to be done

in his capacity as an officer of the said Department. AND WHEREAS the said Secretary of State has also on his part agreed that the said shall be paid for such service at and after the rate of not less than rupees per month and shall be entitled to all the rights and privileges in respect of pay pension and promotion accorded to officers of the said Department for the time being by the Rules and Regulations of the Department. AND WHEREAS for the purpose of securing and indemnifying the said Secretary of State his successors in office and assigns against all loss and damage which he or they might or may in any way suffer by reason of the said leaving without permission the service of the said Secretary of State his successors in office or assigns in less than five years after the completion of his studies at the said School and for the purpose also of securing the refund to the said Secretary of State his successors in office and assigns of the total cost including the monthly payments made to the said
while at the said School incurred by the said Secretary of State or his successors in office or assigns in respect of the education of the said at the said School and in consideration of the payment and education so as aforesaid to be made and given to the said at the said School and as one of the conditions of the admission of the said to the said School it has also been agreed that the said
and the said and
as his sureties should execute the above-written Bond subject to the condition hereinafter contained. Now the condition of the above-written Bond or obligation is such that if the said shall well and faithfully and diligently pursue his studies at the said School and qualify for the said forest service and shall also after completing his studies at the said Forest School and if so required to do serve the said Secretary of State his successors in office and assigns in the Forest Department of the Government of British India or of any Local Government for a period of not less than five years and shall during the whole of such period diligently and efficiently do all acts and discharge all duties which may be required to be done by him in his capacity as an officer of the said Department and if the said
and
or either of them their or either of their heirs executors administrators and representatives shall well and truly indemnify the said Secretary of State his successors in office and assigns against all loss and damage which he or they might or may in any way

suffer by reason of the said giving cause for dismissal either while at the said School or while in the service of Government thereafter or of his leaving the service of the said Secretary of State his successors in office or assigns without permission in less than five years after the completion of the studies of the said at the said School and if the said and or either of them their or either of their heirs executors administrators or representatives shall also pay to the said Secretary of State his successors in office or assigns all sum or sums in any way expended paid or incurred by the said Secretary of State his successors in office or assigns in respect of the education of the said at the said School then the above-written Bond or obligation shall be void otherwise the same shall remain in full force and virtue. PROVIDED ALWAYS and it is hereby expressly agreed and declared that these presents shall be treated and considered as entered into under the orders of the Government of India for the performance by the said and and of a public duty and an act in which the public are interested within the meaning of section 74 of Act IX of 1872 of the Legislative Council of India

IN WITNESS, &c.

Notification by the Government of India, Finance and Commerce Department, No. 4760-S.-R, dated Calcutta, the 29th November 1892.

In exercise of the powers conferred by section 8 of the Indian Stamp Act (I of 1879), the Governor General in Council is pleased to remit the duties payable on the agreements and security-bonds required to be executed, under the Rules to regulate appointments and promotions in the Provincial Forest Service, by students and their sureties previous to entry into the Forest School, Dehra Dún.

Rules for entry of Native Non-Commissioned Officers.

RESOLUTION.—The Governor General in Council, in supersession of the orders dated 13th November 1880, is pleased to sanction the following rules for the entry into the Forest Department

as Rangers of Native Non-Commissioned Officers of Her Majesty's Army :—

I.—Any such officer, who is recommended for the purpose by his Commanding Officer, may apply to a * Conservator of Forests in the Bengal Presidency, or to the Director of the Imperial Forest School at Dehra Dún, for permission to follow, at that institution, the course of instruction in the Upper or English class, with a view to secure, after successfully passing through the School and obtaining a Ranger's certificate, an appointment as Forest Ranger in one of the Provincial Forest Services.

* *Addresses of Conservators of Forests.*

Bengal Circle, Darjeeling.
Assam Circle, Shillong.
N.-W. P. and Oudh—
  School Circle, Dehra Dún.
  Central Circle, Naini Tal.
  Oudh Circle, Naini Tal.
Central Provinces—
  Southern Circle, Nagpur.
  Northern Circle, Jabalpur.
Berar Circle, Amraoti.
Punjab Circle, Lahore.
Upper Burma—
  Eastern Circle, Mandalay.
  Western Circle, Mandalay.
Lower Burma—
  Pegu Circle, Rangoon.
  Tenasserim Circle, Moulmein.

II.—The Forest Officer to whom application is made must be satisfied—

(*a*) that the candidate will not be more than 30 years of age when he enters the School;

(*b*) that he has been sufficiently well educated, especially in Mathematics and English, to enable him to follow the School course with advantage and to obtain a Ranger's certificate;

(*c*) that he is of good constitution and active habits, and possesses fair ability and powers of observation, as well as such physical qualifications as are required for a good Forest Officer.

III.—If the conditions in the preceding rule are satisfied and the candidate is accepted by a Local Government for an appointment in the Provincial Forest Service, he may be admitted to the School, and be allowed to receive the stipend admissible to private students under rule 12 (ix) of the rules appended to circular No. 11-F., dated 28th June 1893. While at the School, with the exception that he need not attend drills, he will in all respects be subject to the rules appended to that Circular.

IV.—On obtaining a certificate at the conclusion of the School curriculum, the candidate will be eligible to be appointed as Ranger. On being so appointed, he will be subject, as regards future promotion, to the regulations of the Forest Service for the time being. As regards other conditions of service, the candidate

either shall, on obtaining his appointment to the Forest Department, take his discharge from the Army, and then 12 months of his period of instruction at the Forest School will count as service under article 388, rule 4, of the Civil Service Regulations; or he may serve in the Forest Department and be transferred to the Native Unattached List under the conditions in Army Regulations, India, Volume II, Part II, and in that case he will qualify for the special rates of pension admissible under military regulations. (See Army Regulations, India, Volume I, Part II.)

V.—During the School course the candidate will be seconded in his corps, which he shall rejoin if he fails in obtaining a certificate.

2. These rules do not apply to the Presidencies of Madras and Bombay; but the Governor General in Council has recommended them to the consideration of the Governments of those Presidencies. (Circular 28 F. of November 30, 1893).

ORGANIZATION OF THE FOREST SERVICE.

The Forest Service is composed as follows:—

(*a*) The Indian Forest Service.
(*b*) The Provincial Forest Service, designated according to Provinces, *e g.*, "Bengal Forest Service," "Punjab Forest Service," etc
(*c*) The Subordinate Forest Service, also designated according to Provinces, *e.g.*, "Subordinate Forest Service, Punjab."

I. The *Indian Forest Service* is recruited *only* by officers appointed under covenant with the Secretary of State, and who have received a professional training either under the regulations which may from time to time be laid down by the Secretary of State, or in such other manner as may be approved by him.

II. The *Provincial Forest Service* can *only* be entered through the Forest School at Dehra Dún—*vide* "Rules to regulate the constitution of, admission to, and studies and discipline at, the Imperial Forest School, Dehra Dún."

The *Provincial Forest Service* consists of—
(*a*) Foresters who have obtained the Forest School certificate, on Rs. 15, 20, 25, 30, 40 per mensem.
(*b*) Rangers on Rs 50, 60, 80, 100, 120, 150 per mensem.
(*c*) Extra-Assistant Conservators on Rs. 200, 250, 300, 350 per mensem.
(*d*) Extra-Deputy Conservators on Rs. 450, 500, 550, 600 per mensem.

Appointments to the class of Forest Rangers may be given.

(1) To passed students of the Forest School—
(*a*) who have obtained the School Certificate in Forestry (Higher Standard) with or without honours;
(*b*) who have obtained the School Certificate in Forestry (Lower Standard) *with honours*, and who have afterwards rendered not less than *two* years' satisfactory service as Foresters.

(*c*) who have obtained the School Certificate in Forestry (Lower Standard) *without honours*, and who have afterwards rendered not less than *five* years' satisfactory service as Foresters.

All such appointments to fill existing vacancies may be made under the orders of the Conservator of Forests.

Candidates who are not natives of the province in which the appointment is to be made, or of a province in which one of the principal languages is the same, must furnish a certificate of having passed an examination by the Lower Standard in one of the principal languages of the province; or, in Burma, of having passed by the Elementary Standard in Burmese.

(2) Where there are no officers of class (1) qualified for appointment, but not otherwise—

(*a*) to subordinates who have earned such promotion by long, faithful, and meritorious service.

(*b*) to Native Non-Commissioned Officers of Her Majesty's Army who have entered the Forest Department.

Such appointments, to fill existing vacancies, may only be made under the orders of the Local Government.

Appointments to the class of Extra-Assistant Conservators (on salaries ranging from Rs. 200 to Rs. 350) may be given—

(1) To Forest Rangers—

(*a*) who have obtained at the Forest School the Certificate in Forestry (Higher Standard) *with honours*, and who have afterwards rendered not less than *two* years' satisfactory service as Rangers in executive charge; or

(*b*) who have obtained this Certificate *without honours*, and have afterwards rendered not less than *five years'* satisfactory service as Rangers in executive charge; or (in exceptional cases only)

(*c*) who were members of the Forest Department on the 1st December 1881, and who, though they have not obtained the Certificate in Forestry (Higher Standard), have done specially good and faithful service, including a term of not less than *five* years as Forest Rangers, and who have received a good general education and possess a sufficient knowledge of English.

(2) Where there are no Rangers in the province qualified for promotion under the above rules, but not otherwise—

(*a*) to candidates who, prior to the 1st July 1891, had been nominated by a Local Government under the rules embodied in section 36 of the Forest Department Code (3rd edition);

(*b*) to Rangers who, otherwise qualified, have not served the prescribed time.

In granting such appointments, students who obtain certificates *with honours* should be preferred to those who obtain certificates *without honours*.

Candidates nominated prior to the 1st July 1891 will continue to draw the allowances granted to them under section 39 of the Forest Department Code (3rd edition).

Appointments to the class of Extra-Deputy Conservators (on salaries ranging from Rs. 450 to Rs. 600) will be made by the promotion of officers of the Provincial Forest Service who hold the Higher Standard Certificate in Forestry of the Forest School, and who have done good service of not less than five years as Extra-Assistant Conservators in either of the two upper grades (Rs. 350 and Rs. 300) of the latter class.

III. The *Subordinate Forest Service* comprises Foresters who have not obtained the Forest School certificate, on Rs. 15, 20, 25, 30, 40 per mensem, and Guards and other subordinates on such rates of pay and of such grades as local circumstances may require.

All appointments to the *Subordinate Forest Service* are made by Conservators, and when the salary is less than Rs. 15 per mensem by Divisional Officers.

SYLLABUSES OF THE SUBJECTS TAUGHT.

FORESTRY.

English Course.

SYLVICULTURE.

I.—The Composition of Forests.

1. *Trees.*—Definitions; mode of growth and reproduction; requirements with regard to light, moisture, &c.; classification of trees; gregarious and non-gregarious species; indigenous and exotic species.

2. *Principal characters or requirements of trees,* illustrated by references to the more important forest species in India as regards—

Habitat;
Temperament;
Root system and aptitude to produce stool-shoots and suckers;
Fructification;
Usual dimensions, longevity, &c.;
Purposes for which used—
(1) wood, (2) accessory products.

3. *Crops.*—Their characters; spontaneous and artificial crops; pure and mixed crops; types of the more important forest crops in India.

4. *The struggle for existence*—Amongst individual trees in a forest crop; principal factors which influence this struggle under various circumstances; illustrations and examples in India.

5. *Pure and mixed crops.*—Relative advantages and disadvantages of each class under various circumstances. Rules for growing pure and mixed crops. Illustrations drawn from Indian forests.

Note.—This course extends over the whole of 21 months of instruction as follows:—

July 1 to October 31.—Rains term, 1st year. Sylviculture IV.
November 1 to March 31 —Winter term, 1st year. Sylviculture I, II, III.
April 1 to May 31.—Hill tour, 1st year. Utilization and practical sylviculture.
July 1 to October 31.—Rains term, 2nd year. Utilization and working-plans.
November 1 to March 15.—Winter term, 2nd year. Revision of whole subject.

II.—Methods of treating and exploiting forests.

1. *Definitions of general principles.*—Organized and unmethodical exploitations; rules regarding the allocation of the fellings.

2. *The principal methods of treating or exploiting forests explained, with special reference to improvement fellings and regulation of the future stock, viz.:—*

High forest treated by the selection method.
Ditto clearance method; natural regeneration and artificial regeneration.
High forest treated by the uniform and group methods.
Simple coppice.
Coppice with standards.
Provisional methods of treatment, conversions, transformations, and restorations.

3. *Detailed examination of each of these methods of treatment.* Nature of crops and conditions under which each is especially suitable; manner of applying the method in each case; cultural operations required in connection with each.

4. *Example of the application of each of these methods to some of the more important or abundant Indian forest crops.*

III.—The Maintenance and Improvement of Forests.

1. *Attention to be given to the soil in sylviculture.*
2. *Fostering operations in young crops.*
   Clearings.
   Thinnings.
   Prunings.
3. *Other operations made with a view to the improvement of the crop, viz.:—*
   Climber cutting, irrigation, and drainage works.
4. *Summary remarks regarding the causes of injury and the necessity and practicability of combating them—*
   Fire-conservancy.
   Grazing.
   Rights and privileges in forests.

IV.—Artificial creation and restocking of forests.

1. *Methods by which trees may be reproduced artificially.*
2. *Collection, treatment, and storage of seed.*
3. *Direct sowings.*
4. *Whole area sowings*—(with cultivation; without cultivation).

5. *Partial sowings*—in strips, in patches and plots; in trenches and furrows; on ridges, in holes and hollows: cases in which each of these methods may be best employed.

6. *Obstacles to direct sowing.*—Obstacles commonly met with and means of overcoming them.

7. *Planting.*—Cases in which necessary: why generally preferable to direct sowings.

8. *Nursery management.*—Laying out the nursery; permanent and temporary nurseries; size of nursery; soil; manures; seed-beds; sowing the beds; season for sowing; treatment of the seed-beds after sowing; weeding and irrigation; transplanting in the nursery lines when necessary; precautions.

9. *Planting out.*—Properties of good transplants; manner of conducting operations; packing and transport of the planting material.

10. *Different methods of planting out.*—In pots or baskets; in holes, notches, and hollows: in trenches; on mounds and ridges; on platforms and trees: cases in which each of these methods may be successfully employed.

11. *Obstacles to planting frequently met with and methods of overcoming them.*—The artificial restocking of swampy or water-logged land, drifting sands and unstable slopes, barren soils, areas where rainfall is insufficient, &c.

12. *Relative advantages and disadvantages of direct sowing and planting compared.*

13 *Maintenance operations in a young plantation.*—Freeing the heads of young plants, cleaning, thinning, fencing, &c.

UTILIZATION.

I.—Working agency and organization of labour.

II.—Utilization of wood.

1. The technical properties of wood.
2. Classification of wood for purposes of sale.
3. The different wood-using industries and the quantity and condition of the wood they respectively require.
4. Tools, &c., used for felling and conversion.
5. Felling.
6. Conversion, seasoning, and storage of wood.
7. Disposal and sale of wood.

III.—Utilization of minor produce

1. Leaves, including grazing and fodder, and litter and manure.
2. Flowers and fruit.
3. Bark.
4. Minor produce obtained from wood, including dyes, tans, and other extracts, oils, acids, wood spirit, tar, &c.
5. Roots.
6. Exuded products, including sugary sap, gums, resins, varnishes, caoutchouc, &c.
7. Animal products, including lac, silk, honey, wax, hides, horns, also the regulation of hunting, shooting, and fishing.
8. Mineral products.

IV.—The principal minor forest industries.

1. Charcoal-making.
2. Manufacture of cutch and katha.
3. Distillation of sandalwood oil.
4. Preparation of resin and turpentine products.
5. Impregnation of timber.

WORKING-PLANS.

I.—General Principles and Definitions.

1. *Forest organization,* in what it consists; meaning of the term "Working-plan," its purpose and reason why required; constitution of the growing stock in organized forests.

2 *Meaning of terms employed in Working-Plans*—exploitability, exploitable age, felling or girdling rotation, possibility, permanent and provisional plans, provisional period, revenue, working-circle, block, compartment, method of treatment, permanent and provisional treatment, classes of fellings, regeneration fellings, improvement fellings.

II.—Field work required in connection with the preparation of a Working-Plan.

1. *Preliminary reconnaissance of the area;* information required with regard to it.

2. *Selection of methods of treatment to be applied and formation of working-circles.*

3. *Analysis of crop*; sub-division of area into blocks and compartments, and reasons for this sub-division; selection of the compartments, their size and boundaries.

4. *Description of the compartments*; degree of detail required; information to be recorded with regard to the (*a*) situation, (*b*) the soil, (*c*) the standing stock.

5. *Manner in which the description is drawn up*; graphic method of recording the nature of the crop; stock maps.

6. *Determination of the number of trees in a crop*; different methods employed to determine the number of trees; choice of a method; selection of plots in the method by sample plots; size classes of trees; manner of enumerating the trees; recording the results of the enumeration.

7. *Calculation of the volume of material in a crop*; cases in which used; methods of making the calculation; method by type trees; measurement of standing trees; measurement of felled trees; measurement of stacked timber.

8. *Determination of the exploitable age of trees*; method by readings on stumps; method by measurement with Presslers' gauge recording the results of the readings.

III.—The preparation of Working-Plans.

1. Working-Plan for a simple coppice.
2. " coppice with standards.
3. " seedling forest by the selection method.
4. " " methods of clearances and strip method.
5. Working-Plan for a seedling forest by the uniform method of successive fellings and thinnings.
6. Working-Plan having in view the regulation of the future stock.
7. Working-Plan for (Uebergangs period) transformation period.

IV.—The Working-Plan Report.

1. Order and arrangement of the subjects to be treated in a Working-Plan Report.
2. Code prescriptions regarding the preparation of Working-Plans and for securing adherence to them.

MATHEMATICS.

(With its Forest Application.)

English Course.

I.—Arithmetic and Algebra.

1. *Proportion*—Comparing rates for material and work in different districts.

2. *Arithmetical Progression*
3. *Geometrical* „

} Application to calculation of increase of volume of growing stock or individual trees, &c.

4. *Interest, simple and compound.*
5. *Discount.*
6. *Present value.*
7. *Annuities.*

} Applied to estimating the value of forests as they stand and value after a period of years; advantages accruing from capital expenditure on works of improvement, or having for their object the cheapening of export or conversion charges.

8. *Logarithms*—to simplify calculations.

II.—Trigonometry.

1. English and French methods of sub-dividing angles.
2. Trigonometrical ratios.
3. „ of angles of 30°, 45°, 60°, 90°.
4. Logarithms and logarithm tables.
5. Heights and distances, with special reference to problems occurring in forestry and surveying.
6. Solution of triangles with and without the use of logarithms.

III.—Mensuration.

1. Applied to standing trees.
2. „ fallen trees.
3. „ timber in log.
4. „ converted timber.
5. „ firewood in stacks, &c.
6. „ charcoal.
7. „ earthwork.

IV.—Statics.

1. Definitions and preliminary ideas.
2. Pressure, tension, and weight.
3. Composition and resolution of forces acting at a point.
4. Resultant of parallel forces, the couple.
5. Moments.
6. The lever.
7. The balance and steelyard.
8. Pulleys.

PHYSICAL SCIENCE.

English Course.

I.—Chemistry.

1. Preliminary notions; nomenclature; symbols; formulæ; equations.
2. Elements; non-metals, metals.
3. Oxygen, its properties; its preparation; its occurrence in nature.
4. Hydrogen, its properties; its preparation; its occurrence in water.
5. Nitrogen, its properties; its preparation; its occurrence in air.
6. Oxides, bases, acids, alkalis, salts.
7. Ammonia, nitric acid, occurrence in nature.
8. Chlorine, bromine and iodine; hydrochloric acid.
9. Carbon and its different forms; combustion and the structure of flames; carbo-hydrates.
10. The oxides of carbon; their properties, their preparation, their occurrence in nature.
11. Sulphur; its properties, preparation and occurrence in nature; oxides of sulphur.
12. Phosphorus; its properties, preparation and occurrence in nature; phosphates.
13. Silica; its properties and occurrence in nature.
14. Metallic elements: groups; potassium, sodium, calcium, aluminium, magnesium, iron, copper.

II.—Physics.

1. Definition, branches, preliminary ideas.
2. Matter, its forms; mass, volume, weight.

3. Solids, liquids and gases; comparative properties; pressure; specific gravity.

4. Capillary phenomena; endosmose and exosmose.

5. Pressure of the atmosphere; the barometer; air-pump, common pump, force-pump, syphon.

6. Heat; expansion; the thermometer; fusion, sublimation, evaporation, ebullition, steam; distillation; conduction, convection, and radiation.

7. Light; reflection, refraction, the telescope, the microscope.

8. Magnetism; the magnetic needle and its applications.

III.—Physiography.

1. The earth and its position in the solar system; the sun, the moon, motions of the earth; day and night; the seasons.

2. The atmosphere, its density, depth and composition; dew and hoar-frost, fog, cloud, rain, hail, snow. The winds, their causes; the monsoons; trade winds; land and sea breezes.

3. The ocean; its distribution; depth; composition; currents; tides.

4. Rivers; catchment basins; watersheds and water partings; springs; mountain torrents; deltas; lakes.

5. Ice and snow; glaciers; moraines; icebergs.

6. Mountain chains; their character and distribution, cause of upheaval, valleys.

7. Denudation; action of the sea, of rivers and ice; action of the atmosphere; decomposition and disintegration of rock; formation of soil.

8. Internal heat of the earth; earthquakes, volcanoes, hot springs.

9. The land and its tenants. Distribution of land and water, general structure of the existing continents. Asia, its position and character. India, its rivers, mountains, plains, rainfall, seasons, winds.

10. Flora and Fauna; their relation to the temperature and rainfall. Zones of vegetation, especially tree.

IV.—Geology and Mineralogy.

1. Sedimentary rocks; their origin, varieties and composition; sandstone; conglomerates; shales.

2. Organic rocks; their origin, composition and characteristics; chalk; limestone; peat; coal.

3. Igneous rocks; their composition and origin; lava; trap, basalt, granite.

4. Metamorphic rocks; gneiss, mica, schist, marble, slate, quartzite.

5. Stratification; its cause; dip and strike; horizontal strata and inclined strata; faults.

6. Chronological orders of stratified rocks, characteristics of the great formations; organic remains (fossils) found in them.

7. Short account of Indian geology; characteristics of Peninsular and extra-Peninsular areas

8. Chief physical properties of minerals; chemical composition and common tests.

9. Chief minerals of India; quartz, mica, felspar and kaolin; ores of iron, laterite, kunkur; lime-stone, 'tufa,' &c.

V.—Soils.

1. Modes of formation.

2. Organic and inorganic constituents; soluble and insoluble ingredients.

3. Classification of soils; sand, clay, loam, humus.

4. Subsoil; surface soil; influence of organic life; influence of vegetation; influence of the circulation of water; influence of temperature.

5. Physical properties of soil; chemical properties; presence of gases.

6. The simple analysis of soils.

7. The improvement of soils; chief organic and inorganic manures and their effects.

BOTANY.

English and Vernacular Courses.

I.—Morphology.

1. The nature of plants as distinguished from animals.
2. Classification of plants.
   (*a*) Phanerogamous plants.
   (*b*) Cryptogamous plants.
3. Phanerogamous plants—their organs.
   (*a*) Organs of vegetation: root, stem, leaves.
   (*b*) Organs of production; flower, fruit, seed.
4. The *root:* fibrous, tuberous, taproots.
   Underground stems or rhizomes: tubers, bulbs, corms.

5. The *stem:* erect, prostrate, creeping, climbing, cæspitose, culms.

Branches: their arrangements and sub-divisions.

6. The *leaves:* petiole, blade, stipules.

Simple and compound leaves, entire or lobed leaves, opposite and alternate leaves, the various shapes of leaves.

7. The *inflorescence:* terminal or auxiliary, centrifugal or centripetal: spike, raceme, panicle, head, umbel, cyme, corymb, thyrsus, catkin, spadix, spikelet.

Bracts, involucre, spathe, glumes.

8. The *flower:* perfect and imperfect; monœcious, diœcious or polygamous; dichlamydeous, monochlamydeous.

Parts of the flower: calyx, corolla, stamens, pistil.

9. The *corolla:* gamopetalous, polypetalous, regular or irregular.

Its shape, æstivation, and colour.

10. The *stamens:* filament, anther, pollen.

Arrangement of stamens: monadelphous, diadelphous, &c., didynamous, syngenesious, gynandrous, &c.

11. The *pistil:* ovary, ovule, style, stigma.

Ovary: syncarpous, apocarpous; placentation, axile and parietal. Ovule: straight, incurved, inverted.

12. The *fruit:* simple and compound; dry and succulent; dehiscent and indehiscent.

Kinds of fruit: berry, drupe, capsule, pod, nut, samara, follicle, siliqua, pome, pepo, cone, caryopsis.

13. The *seed:* testa, tegmen, embryo, albumen, funicle, aril, hilum, micropyle; the embryo: radicle and plumule, cotyledons.

14. *Accessory organs:*—Thorns, prickles, tendrils, hairs, glands.

II.—Anatomy.

1. The *cell:* nature of the cell, cell-wall, protoplasm, formation of new cells, substances contained in protoplasm, cell sap.

2. *Tissue:*—

(*a*) Cellular tissue—

(1) Epidermis: epidermal cells, stomata, hair structures.

(2) Cork.

(3) Parenchyma.

(*b*) Sclerenchyma: short elements, long elements or fibres.

(*c*) Secretory reservoirs: sacs containing crystals, sacs containing mucilage, sacs containing resins and gum resins, tannin sacs.
(*d*) Tracheæ:—
(1) vessels;
(2) tracheides.
(*e*) Sieve-tubes.
(*f*) Laticiferous ducts: latex.
(*g*) Intercellular spaces: intercellular secretory reservoirs; intercellular spaces containing air and water.

3. Structure of the root—
(*a*) primary or tap root;
(*b*) secondary or lateral roots and rootlets;
(*c*) secondary thickening;
(*d*) root hairs.

4. Structure of the stem—
(*a*) Angiosperms:
(1) herbaceous type, young, mature.
(2) woody type immediately after germination; after formation of primary bundles, when secondary growth in thickness has begun.
(*b*) Gymnosperms (similar divisions).
(*c*) Monocotyledons—
(1) herbaceous type;
(2) arboreous type; no secondary thickening: palms, bamboos; with secondary thickening: Liliaceæ.

(5). Structure of the leaf—
(*a*) Angiosperms—
(1) petiole;
(2) blade: bifacial type, centric type.
(*b*) Gymnosperms.
(*c*) Monocotyledons.

6. Structure of the reproductive organs: structure of the pollen grain; structure of the embryo; fertilization.

7. *Fungi.*—Structure, reproduction.

III.—Physiology.

1. *The external conditions of plant life:* temperature, light, gravitation, periodicity of temperature and light.

2. *The internal conditions of plant life:* diosmose; turgescence; tissue—tensions.

3. *Nutrition*—
   (*a*) Absorption of moisture and nutritive matter in solution by the roots; nutritive materials so obtained.
   (*b*) Transpiration.
   (*c*) Assimilation; taking up and fixing of carbon by the leaves; other bodies absorbed by the leaves.
   (*d*) Metabolism; change of nutritive materials, *e.g.*, starch into other nutritive substances; reserve materials; ferments; dormant periods.
   (*e*) Passage of the elaborated materials through the tissues.
   (*f*) Respiration.
   (*g*) Ascent of water.
4. *Growth*—
   (*a*) The three phases of growth: embryonic growth, elongation, completion of internal differentiation.
   (*b*) Formation of organs at the growing point: development of leaves, buds, and branches, internodes.
   (*c*) Correlations of the different organs: influence of growing shoots on other shoots; organs of like kinds complete for the same constructive materials, hence scale leaves and dormant buds; influence of root activity on the functions of leaves.
   (*d*) Nutations and torsions due to unequal growth.

IV.—Wounds and Diseases.

1. Healing up of wounds—
   (*a*) in herbaceous parts; bark abrasures;
   (*b*) in woody parts; cuts extending to the wood.
2. Parasites; their action—
   (*a*) flowering parasites—
      (1) root parasites: Orobanche, &c.;
      (2) stem and branch parasites: Loranthus, &c.
   (*b*) Fungi:—
      (1) parasitic: those entering by the roots; those which enter by wounds; those which attack the leaves.
      (2) saprophytic.
3. Injuries caused by atmospheric phenomena:—
   (*a*) temperature: frost, excessive heat, alternations of heat and cold.
   (*b*) winds: hot winds, storms.
4. Injuries by fire.

V.—Classification.

1. Classification of plants; classes, orders, genera, species, varieties, individuals.

2. Divisions of phanerogams: Dicotyledons and Monocotyledons, characters of the two groups in seed, leaf, stem, &c.

3. Divisions of Dicotyledons—

Angiosperms, with seed enclosed in a pericarp;
Gymnosperms, with naked seeds.

4. Angiospermous plants—

(*a*) Polypetalæ, subdivided into Thalamifloræ and Calycifloræ.
(*b*) Gamopetalæ.
(*c*) Apetalæ.

(Characters of each.)

5. Thalamiflorous orders, especially those of forest consequence. Some of the following:—

(*a*) Dilleniaceæ;	(*h*) Sterculiaceæ;
(*b*) Magnoliaceæ;	(*i*) Tiliaceæ;
(*c*) Anonaceæ;	(*j*) Rutaceæ;
(*d*) Guttiferæ;	(*k*) Burseraceæ;
(*e*) Ternströmiaceæ;	(*l*) Meliaceæ;
(*f*) Dipterocarpeæ;	(*m*) Sapindaceæ;
(*g*) Malvaceæ;	(*n*) Anacardiaceæ;

Give an analysis, enabling each to be determined.

6. Calyciflorous orders, especially those of forest consequence. Some of the following:—

(*a*) Leguminosæ;	(*e*) Myrtaceæ;
(*b*) Rosaceæ;	(*f*) Lythrarieæ;
(*c*) Rhizophoreæ;	(*g*) Samydaceæ;
(*d*) Combretaceæ;	(*h*) Cornaceæ;

Give an analysis, enabling each to be determined.

7. Gamopetalous orders, especially those of forest consequence:—

(*a*) Rubiaceæ;	(*g*) Loganiaceæ;
(*b*) Ericaceæ;	(*h*) Boragineæ;
(*c*) Sapotaceæ;	(*i*) Bignoniaceæ;
(*d*) Ebenaceæ;	(*j*) Acanthaceæ;
(*e*) Oleaceæ;	(*k*) Verbenaceæ;
(*f*) Apocyncæ;	(*l*) Labiatæ;

Give an analysis, enabling each to be determined.

8. Apetalous orders, of forest consequence, Some of the following:—

(*a*) Santalaceæ;
(*b*) Lauraceæ;
(*c*) Urticaceæ;
(*d*) Euphorbiaceæ;
(*e*) Cupuliferæ;
(*f*) Juglandeæ;
(*g*) Salicineæ;

with analysis.

9. Gymnosperms; the two chief orders of which are—

(*a*) Coniferæ.
(*b*) Cycadaceæ.

10. Monocotyledons. The following being those of chief importance:—

(*a*) Palmæ.
(*b*) Liliaceæ.
(*c*) Gramineæ.

11. Cryptogamæ—Plants with no stamens or ovaries, spores of single cells:—

Group I—Vascular cryptogams.
„ II—Muscineæ.
„ III—Thallophytes.

12. Vascular cryptogams, chief family of forest interest.

(*a*) Filices.

13. *Muscineæ.*—Mosses in respect to their influence on the soil, on tree trunks, &c.

14. *Thallophytes.*—Algæ and Fungi, separated by presence and absence of Chlorophyll; former of but slight forest interest; latter often of great importance.

15. *Fungi.*—As causes of decomposition and disease. Very short account of the chief families of forest interest:—

(*a*) Schizomycetes, causes of disease.
(*b*) Saccharomycetes, ferments.
(*c*) Peronosporeæ, leaf diseases.
(*d*) Uredineæ, rusts, Æcidia, &c.
(*e*) Hymenomycetes, chief species as Agaricus, Polyporus, Trametes, Merulius, destructive to trees and timber.

16. The collection and perparation of specimens.

VI.—Geography.

1. General distribution of forests and cultivated plants.
2. Chief trees of India, their distribution.

3. Chief regions or zones of vegetation, and their relationship to the rainfall.

4. Chief classes of Indian forests, conifer forests, oak forests, forests of the arid region, sál forests, mixed forests, evergreen forests, littoral forests, humid forests.

FOREST ZOOLOGY.

A.—Theoretical Course.

1. Explanations, with illustrations, of technical terms.
2. Classification of animals, reduced as far as possible to analytical tables.
3. Anatomy and morphology of insects.
4. Examination of types as an introduction to the general study of Zoology (after the plan of Huxley's 'Crayfish.')
5. The study of animals which are useful or the reverse to forests and trees, illustrated as far as possible by diagrams from Indian subjects.

B.—Practical Course.

1. Dissection of the types considered under A4.
2. Identification of specimens.
3. Collection and preservation of specimens.

DRAWING, SURVEYING, AND ESTIMATING.*

English Course.

I.—Drawing.

A.—*Theoretical Course*—

1. Freehand.
2. Model.

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* Note.—This course extends over the whole 21 months of the instruction as follows:—

Rains term	... 1st year	...	I. A.; I B. 1 to 4; II. A.
Winter „	... „	...	II B. 1 to 6.
Hill tour	... „	...	Visit to works and notes on roads, bridges, houses, &c.
Rains term	... 2nd year	...	I. B. 5 to 8; III.
Winter „	... „	...	II. B. 7.

3. Problems in geometrical drawing which will be of use in Surveying Course and are necessary for construction of scales, &c.
4. Explanation of terms plan, section, elevation.
5. Use of the more simple instruments, such as the compass, parallel ruler, set squares, &c.
6. Conventional signs and colouring, printing.
7. Hill shading, contour lines.

B.—*Practical Course*—

1. Copying maps, tracing maps.
2. Construction of scales.
3. Enlargement and reduction of maps—
   Pentagraph.
   Method by squares.
   With proportional compasses.
4. Calculation of areas, by triangles, by co-ordinates, by acre comb, by planimeter.
5. Plotting and drawing the results of surveying exercises.
6. Ditto ditto levelling.
7. Ditto ditto independent survey.
8. Ditto ditto road and house and other projects.

II.—Surveying.

A.—*Theoretical Course*—

1. Chain surveying, maintenance and form of field-books.
2. Survey with prismatic compass and chain, field-book, plotting with protractor.
3. Plane-table survey.
4. Levelling—form of field-book, &c.

B.—*Practical Course.*—

1. Chain survey.
2. Traverse of roads with prismatic compass and chain.
3. Traverse of boundary of a closed area with prismatic compass and chain. Plotting, rectification of small errors.
4. Plane-table survey.
5. Levelling.
6. Use of maps in the field.
7. Survey (unaided), with prismatic compass and chain, of about a square mile of land, filling in details with plane-table, and levelling or circuit of about half a mile.

III.—Estimating.

A.—*Theoretical*—

1. Projection of lines, outlines of solid geometry.
2. Estimation of volume of earthwork and cost of excavation.
3. Estimation of wall-work, timber, &c.
4. Form of estimate, plan, and specification.

B.—*Practical*—

1. Road project, including—
   (*a*) traverse of road with prismatic compass and chain.
   (*b*) longitudinal section along centre line.
   (*c*) cross sections.
2. Plan, elevation, and section of a simple wooden bridge, with estimates for ditto.
3. Plan, elevation, and sections of a masonry culvert.
4. Plan, elevation, and sections of a Range Head-quarters house.
5. Repairs to houses and estimates for ditto.

FOREST ENGINEERING.

English Course.

I.—*Building Materials*—

1. Stone—
   (*a*) The various qualities.
   (*b*) Method of extraction and preparation.
2. Brick—
   (*a*) The various qualities.
   (*b*) Preparation, including the various methods of moulding and burning.
3. Earth—
   (*a*) Qualities suitable for building.
   (*b*) Method of preparation.
4. Tiles—Flat and hollow; method of manufacture.
5. Lime—
   (*a*) Various qualities of limestone.
   (*b*) Preparation.
   (*c*) Storing.
   (*d*) Its different uses in construction.

6. Timber—
   (*a*) Preparation and seasoning.
   (*b*) Suitability for various parts of the structure, in reference to qualities of various species.
   (*c*) Some of the more important timbers used in construction—Teak, Sál, Deodar, &c.
   (*d*) Preparations for preserving and beautifying wood: paints, varnishes, tar, &c.
   (*e*) Carpentry and joinery, including the more common and useful joints, scarfs, mortices, trusses and scantlings, doors, windows, railings, &c.

II.—*Building*—

1. Foundations—
   (*a*) Selection of site; soils.
   (*b*) Excavation.
   (*c*) Materials used, concretes.
   (*d*) Plinths.
2. Walls—
   (*a*) Construction in various materials.
   (*b*) Thickness relatively to height and nature of roofing.
3. Arches: in doorways, culverts, and roofs.
4. Floors: terraced, tiled, wooden, asphalt, earth. Construction and protection from insects and damp.
5. Roofs—
   (*a*) Terraced, tiled, shingle, thatched, iron roofs. Construction and comparative advantages of weight, durability, coolness, and cost.
   (*b*) Method of support, beams, trusses, rails, &c.
6. Chimneys and fireplaces. Main principles of construction, including safety chimneys, flues, &c.
7. Drainage, lightning conductors, and other details.
8. Plans, specifications, estimates, and especially working drawings.

III.—*Road-making*—

1. Roads, temporary and permanent, cart-roads, sledge-roads, inspection and bridle-paths in the hills and plains.
2. Alignment of roads in hills and plains as affected by necessities of export, such as carriage employed and direction of export, with special reference to gradients and avoidance of physical difficulties.

3. Methods of laying out roads in level country, or in country with definite gradients, with levels, road-tracers, &c.; curves, drainage, &c.
4. Construction, earthwork, stone-cutting, and rock-blasting, embankments and cuttings, metalling.
5. Estimates.

IV.—*Bridges*—

1. General principles regulating height and span.
2. Different principles employed in construction.
3. Selection of sites and laying out approaches.
4. Simple wooden bridges and with trusses.
5. Simple wire-rope bridges.
6. Rail bridges.
7. Masonry culverts.
8. Estimates.

V.—*Transport of Timber*—

1. Simple transport carriage by carts, beasts of burden, and coolies.
2. Sledge-roads.
3. Tramways.
4. Wet and dry slides.
5. Transport by water, including rafting and floating.

VI.—*Wells*—

1. Permanent and temporary, wood and masonry.
2. Selection of sites in reference to the various soils.
3. Construction; methods of sinking.
4. Cleaning and protection.

VII.—*Water and River Bank Works*—

1. Embankments and dams for retaining water.
2. Simple canals.
3. Masonry bunds for protection of river and torrent banks.
4. Spurs and cribs for ditto.

VIII.—*Demarcation*—

1. Boundary marks: various kinds of marks used according to character of country and materials available.
2. Boundary lines, rides, and roads.
3. Block and compartment lines.

FOREST LAW.

English Course.

General Notions regarding Property.

I.—General Law—

1. Of property and its acquisition.
2. Of possession.
3. The consequences of possession.
4. The transfer of property.

General Notions regarding Rights and Servitudes.

5. Their nature.
6. Distinction between servitudes and ownership.

The Easements Act, and Statute of Limitations.

Of Government Property and its Acquisition.

7. Estates held by succession from former Governments.
8. Lands occupied by roads, canals, river-beds, railways, &c.
9. Waste lands.
10. Lands acquired for public purposes.

II.—Forest Law—

Of Forest Law in India.

1. Reasons for special law.
2. Forest Laws in Europe and in India. The Indian Forest Acts and Regulations.
3. To what lands the special laws apply.
4. The constitution of permanent Forest Estates in India.
5. Of the protection of trees and natural produce on lands not being forests.

The Limitation to which Rights of User are subject.

6. The principle that rights must be limited and regulated.
7. The extent of the limitation.
8. Principles of regulation applied to different classes of rights.

9. Grazing rights.
10. Grass-cutting.
11. Lopping for fodder and leaf gathering.
12. Wood rights.
13. Removal of dead leaves.
14. Other forest produce.
15. Hunting and shooting.
16. Temporary and shifting cultivation.

The Procedure for Constituting Permanent Forest Estates.

17. The preliminary steps. Difference of procedure under different Acts. Rules for the conduct of Forest Settlement procedure. Importance of exact adherence to legal procedure.
18. Claims to land.
19. Claims to rights of way or of water.
20. Claims to other forest rights.
21. Definition of rights admitted to exist.
22. Method of providing for admitted and defined rights.
23. Commutation of forest rights.
24. Extinction of unclaimed rights.
25. Appeals from orders of a Forest Settlement Officer or Court.
26. Final notification. Importance of accurate description.
27. Forests reserved previous to the passing of the different Acts.
28. Privileges and concessions granted by Government, though not legally proved to be rights of the nature of easements; their regulation.
29. Village forests.
30. Protected forests.
31. Undivided or shared forests.
32. Control over private forests.
33. Rules made under the various Forest Acts and Regulations.

III.—Criminal Law applied to the Protection of Forests and their Produce in transit—

1. Protection against natural calamities.
2. Protection against fire.
3. Protection against offences by human agency.
4. Preventive provisions.
5. The law under which offences are punished.

Application of the Forest Acts to Forest Offences.

6. Offences against the forest itself—
   (*a*) Reserved forests.
   (*b*) Protected forests.
7. Special offences.
8. Cattle trespass. The Cattle Trespass Act.
9. Control of timber in transit and offences connected with it—
   (*a*) Transit by land.
   (*b*) Ditto water.
   (*c*) Drift timber and salving.
   (*d*) Rules regarding drift timber and its disposal.

Application of the Penal Code to Forest Offences.

10. Offences directly connected with a forest or its produce—
   (*a*) Theft or criminal misappropriation.
   (*b*) Receiving stolen property.
   (*c*) Mischief.
   (*d*) Abetment of offences.
   (*e*) Criminal trespass.
   (*f*) Attempt to commit offences.
11. Offences indirectly connected with a forest or its produce—
   (*a*) Unlawful assembly.
   (*b*) Omitting to give aid and information.
   (*c*) Giving false information.
   (*d*) Giving false evidence.
   (*e*) Concealing offenders.

General Principles of Criminal Law relating to Offences.

12. General exceptions (excusing offences).
13. Circumstances aggravating offences.
14. Limitation of time for prosecution.
15. Remarks on conduct of prosecution.

The Legal Principles of punishment.

16. Imprisonment and fine.
17. Confiscation as a punishment under Forest Law.

The Criminal Procedure Law.

18. Complement to the penal laws.

19. Investigation by the Police—
    (*a*) Cognizable offences.
    (*b*) Non-cognizable.
20. Cases on complaint to the Magistrate.
21. The process of Criminal Courts.
22. Criminal trials.
23. Method of obtaining attendance of witness; record of evidence; notes on the Evidence Act.
24. The charges.
25. Execution of sentence and recovery of fines.
26. Appeal and revision.

IV.—THE FOREST SERVICE—

1. General nature of the Forest Service.
2. The appointment of Forest Officers and organization of the service.
3. The special responsibilities of Forest Officers.
4. The protection extended by law to Forest Officers.
5. The legal powers of Forest Officers.
6. Offences against the authority of public servants.

FOREST ACCOUNTS AND PROCEDURE.

English and Vernacular Courses.

I.—*General Principles of book-keeping by single entry.*

II.—*Cash Accounts*—

(*a*) Classification of Revenue and Expenditure.
(*b*) "Capital" and "Ordinary Expenditure," and powers of sanction.
(*c*) The Cash Book and how to keep it.
(*d*) Advances and recoveries of cash, and how they should be dealt with.
(*e*) Vouchers and registers subsidiary to the cash book.
(*f*) Revenue, and procedure as to receiving, remitting, or refunding same.
(*g*) The divisional cash accounts and monthly returns. How to prepare them.

III.—*Forest produce and yield returns*—

(*a*) Accounts and returns connected with the departmental export of produce.
(*b*) Accounts and returns connected with the removal of produce by purchasers.
(*c*) Working Plan returns and forest journals.

IV.—*General Procedure*—

(*a*) Correspondence—how to be dealt with, registers to be kept up, and rules regarding records.
(*b*) Transfer of charge.

TIME TABLE FOR

SENIOR

Time.	Subject.	Day of the Week.	Room.
7 to 8-30 A.M.	Drawing ...	Monday, Wednesday and Friday	Western Lecture Room and Corridor
	Accounts ...	Tuesday and Thursday	Central Lecture Room
8-30 to 10 A.M.	Forest Law ...	Daily July and August	Ditto ...
	Surveying and Forest Engineering	„ September and October	Drawing Hall ...
12 to 1-30 P.M...	Forestry ...	Daily ...	Central Lecture Room
1-30 to 3 P.M.	Forest Engineering	Daily July and August	Drawing Hall ...
	Zoology ...	„ September and October	Central Lecture Room
4 to 5 P.M. ...	Drill ...	Tuesday and Thursday	... ...

SENIOR

7 to 8-30 A.M.	Drawing ...	Monday, Wednesday and Friday	Western Lecture Room and Corridor
	Accounts ...	Tuesday and Thursday	Western small Lecture Room
8-30 to 10 A.M.	Surveying and Forest Engineering	Daily ...	Eastern Lecture Room
12 to 1-30 P.M.	Forestry ...	„ ...	Ditto ...
	Forest Engineering		
1-30 to 3 P.M.	Botany ...	Monday, Wednesday and Friday	Western small Lecture Room
	Forest Engineering	Tuesday and Thursday—July and August	Eastern Lecture Room
	Forest Law ...	Tuesday and Thursday—September and October	Ditto ...
4 to 5 P.M. ...	Drill ...	Tuesday and Thursday	

RAINS TERM 1893.

UPPER CLASS.

Name of Professor.	REMARKS.
Instructors	Drawing I, B 5 to 8.
Babu Kasheshwar Mukerjee ...	Half hour Lecture; one hour practical work.
Mr. N. Hearle, Deputy Conservator of Forests	Whole Course.
Instructor, Mr. C. G. Rogers ...	Estimating III A, and B.
Deputy Director	July, August—Utilization. September, October—Working Plans.
Instructor, Mr. C. G. Rogers ...	Forest Engineering IV to VIII.
Mr. E. C. Cotes, Deputy Superintendent Indian Museum	Whole Course.
... ...	Except for members of the Dehra Dún Mounted Rifles who will drill according to Corps Orders.

LOWER CLASS.

Instructors	Drawing I, B 5 to 8.
Babu Kasheshwar Mukerjee ...	Half hour Lecture; one hour practical work.
Vernacular Instructor ...	Estimating III A, and B, and Engineering II to VIII.
Ditto ...	July, August—Sylviculture II and III. September, October—Utilization.
Babu Birbal	Revision with the Junior Lower Class.
Vernacular Instructor ...	Ditto ditto of S. I, II.
Ditto ...	Ditto of Course.

TIME TABLE FOR

JUNIOR

Time.	Subject.	Day of the Week.	Room.
7 to 8·30 A.M.	Drawing ...	Monday, Wednesday and Friday	Drawing Hall ...
	Forestry ...	Tuesday and Thursday	Western Lecture Room
8·30 to 10 A.M.	Mathematics ...	Ditto ...	Ditto ...
	Botany ...	Monday, Wednesday and Friday	Ditto ...
12 to 1·30 P.M.	Surveying and Forest Engineering	Daily ...	Drawing Hall ...
1·30 to 3 P.M. ...	Natural Science	" ...	Western Lecture Room
4 to 5 P.M. ...	Drill ...	Tuesday and Thursday	... ...

JUNIOR

7 to 8·30 A.M.	Drawing ...	Monday, Wednesday and Friday	Drawing Hall and Eastern Lecture Room ...
	Forestry ...	Tuesday and Thursday	Eastern Lecture Room
8·30 to 9·30 A.M. 9·30 to 10 A.M.	Mathematics ...	Daily ...	Western small Lecture Room
12 to 1·30 P.M.	Natural Science	" ...	Ditto ...
1·30 to 3 P.M	Botany ...	Monday, Wednesday and Friday	Ditto ...
	Forest Engineering ...	Tuesday and Thursday—July and August	Eastern Lecture Room
	Forest Law ...	Tuesday and Thursday—September and October	Ditto ...
4 to 5 P.M. ...	Drill ...	Tuesday and Thursday	

RAINS TERM 1893.

UPPER CLASS.

Name of Professor.	REMARKS.
Instructors	B, I and B 1 to 4.
Deputy Director	Sylviculture IV. Artificial Regeneration.
Ditto	Whole Course.
Instructor, Mr. A. F. Gradon ...	I, II, III, IV, VI.
Instructor, Mr. C. G. Rogers ...	July and August—Drawing I, A, Surveying II A. September and October—Engineering I, II and III.
Instructor, Mr. A. F. Gradon and Mr. S. H. Collins ...	Chemistry, Physics, Physiography, Geology and Soils.
... ...	Except for members of the Dehra Dún Mounted Rifles who will drill according to Corps Orders.

LOWER CLASS.

Instructors	With Upper Class.
Vernacular Instructor ...	Sylviculture IV.
Babu Gopal Singh	Lecture. Exercises.
Babu Birbal	Whole Course.
Ditto ...	Ditto.
Vernacular Instructor ...	S. I and II.
Ditto ...	With Senior Class.

LIST OF STUDENTS ON JANUARY 1, 1894.

Senior Students (Entered July 1, 1892).

Upper Class.

R. G. A. Hannah	Bengal.
Kanhya Lal (2)	N.-W. Provinces.
Ram Swarup	
Hukam Chand	
Parmeshwar Dass	
M. Corbett	Oudh.
A. D Pal	
Ratan Chand	Punjab.
Sita Ram	
Ilm Din	
C. A. Webb	Central Provinces.
J. F Anthony	
P. Shunkernath	
J. D St Joseph	
R C. Pinder	
Vithal Dhondo	
F J. Langhorne...	
S. A Wood	Burma.
Maung Po Yin	
Maung Aung Thu	
F J. Rivett	
P M. Narasa Iyer	Madras.
A. Subba Row	
J A Daly	
K. G. Subba Row	
Syed Burhamuddin	
S. P. Kulasekram Chetty	
C. V. Ryan	
E. H Monisse	
M. Panchipikesa Iyer	
T. V. Armugam Pillai	
C S. Jesudasen Pillai	
Syed Edulla Saib	Hyderabad.
E. A. Partridge	
D. Shunker Bhanap	
T. C Legge	Private.
J. F. Tweedie	
C. A Ramakristna Iyer	
Vaswami Dalpatrai	
Lalwani Dayaram	
T. I. Pocock	
M. Narasinga Row	
K. Rama Row	
D. Raja Row	
B. Srinivasa Row	
P. S. Vasudeva Row	
R. L. Pocock	
Gurbakhsh Rai	

Lower Class.

Durga Datt	N.-W. Provinces.
Ranjit Singh	
Daulat Singh	
Hakumat Rai	Punjab.
Khadim Hussain	

Raghunath Prasad	...	...	Central Provinces.
Mahomed Yasin	...	...	
Sakhawat Hussain	...	...	Jeypore.
Ralia Ram ...	...	...	Private.
Kundan Lal ...	...	...	
Sundar Lal ...	...	...	

JUNIOR STUDENTS (ENTERED JULY 1, 1893).

Upper Class.

Khagendra Nath Mookerjee	...	...	Assam.
Krishna Chandra Sarma	...	...	
W. Breakey ...	...	...	
Mono Mohan Lahiri	...	...	N.-W. Provinces.
Mohamed Nazir	...	...	
Amar Singh ...	...	...	
Sarat Chandra Guha	...	...	
G. L. Abel ...	...	...	Oudh.
Lachhman Das (1)	...	...	Punjab.
Karm Singh ...	...	...	
Sundara Singh	...	...	
Amar Nath ...	...	...	
Gouri Shankar (1)	...	...	Central Provinces.
Chintaman Vishwanath	...	...	
W. H. Craddock	...	...	Berar.
A. S. Roncontre	...	...	Burma.
R. R. O'Hara ...	...	...	Madras.
N. Swaminatha Iyer	...	...	
A. N. Venkatachellam	...	...	
T. Subroilu Naidu	...	...	
K. P. Krishna Aiyar	...	...	
V. Raman Menon	...	...	
M. Srinivasa Aiyangar	...	...	
D. Dorasawmi Pillai	...	...	
Lachhman Das (2)	...	...	Jodhpore.
Dinkar Vishnu Paranjpe	...	...	Baroda.
R. C. Farrell	...	...	Hyderabad.
Nirmal Chandra Chatterjee	...	...	Private.
F. G. Gordon	...	...	
Pyinmana Mintha	...	...	
J. A. Wallinger	...	...	
P. E. Blunkett	...	...	
J. L. Heffermann	...	...	
R. N. Thompson	...	...	
N. Chinniah	...	...	
C. Meenakshaiya	...	...	
W. J. Dalton	...	...	
S. M. Paterson	...	...	
T. W. Forster	...	...	

Lower Class.

Daya Ram	...	...	N.-W. Provinces.
Bhikan Lal	...	...	
Rati Ram	...	...	
Ram Swarúp Tiwari	...	...	Private.
Gauri Shankar (2)	...	...	
Amin Chand	...	...	
Puttú Lal	...	...	
Prabh Dayal	...	...	

LIST OF PASSED STUDENTS OF THE IMPERIAL FOREST SCHOOL.

Name.	Date of Certificate.	Certificate.	Where employed on 1st Jan. 1894.	Rank on 1st Jan. 1894.
J. C. Mendes ...	1881	R.	Bengal ...	Extra Assist. Conservator.
S. C. Chuckerbutty	"	R.	" ...	(Retired.)
A. E. Lowrie ...	1882	S.A.C.	Central Provinces	Assistant Conservator.
K. N Mukerji ...	"	S.A.C	N.-W.P. & Oudh	Extra Assist. Conservator.
Fazl Din (II) ...	"	R.	Panjab ...	" "
Moti Singh ...	Nov. 28, "	R.	" ...	Forest Ranger.
Daulat R. Bimbhat	" "	R.	" ...	Extra Assist. Conservator.
Kirpa Nath De ...	" "	R.	Assam ...	" "
C. K. Chatterji ...	" "	S.A.C.	Central Provinces	" "
Jogesvar Súr ...	" 1, 1883	R.	Assam ...	" "
M. Rao Palnaitkar	" "	R.	...	(Deceased).
C. Ingram ...	" "	R.	Burma ...	Extra Assist. Conservator.
Sadhu Singh ...	" "	R.	Panjab ...	" "
Raghunath Pathak	" "	R.	N.-W. P. & Oudh	" "
K. Nath Mozumdar	" "	R.	Bengal ...	F. R., offg. Ex. Asst. Consr.
Dina Nath Kar ...	" "	R.	...	(Deceased).
Rama Nand ...	" "	R.	Panjab ...	Forest Ranger.
Sundar Lal ...	" "	R.	Patiala State ...	Chief Forest Officer.
G. Mahomed (I)...	" "	R.	Panjab ...	Forest Ranger.
Gurditt Singh ...	" "	R.	Kapurthala State	" Officer.
Bhukan ...	" "	R.	Berar ...	Extra Assist. Conservator.
Nanak Chand ...	Jan. 1, 1884	F.	...	(Deceased).
Maung H. Pe ...	" "	F.	Burma ...	Forest Ranger.
Maung Tun ...	" "	F.	" ...	" "
Ram Narayan ...	" "	F.	N.-W.P. & Oudh	" "
Tara Kisor Gupta...	Dec. "	R.*	Assam ...	Extra Assist. Conservator.
Harswarup (I) ...	" "	R.*	N.-W.P. & Oudh	" "
Gokal Das ...	" "	R.	Panjab ...	Forest Ranger.
Thakur Das ...	" "	R.	" ...	" "
G. Mahomed (II) ...	" "	R.	" ...	" "
V. S. G. Pillai ...	" "	R	Madras ...	Extra Assist. Conservator.
Sada Nand Gairola	" "	R.	N.-W.P. & Oudh	" "
Narayan Prashad ...	" "	R.	Central Provinces	Forest Ranger.
Tincauri Chaudhri	" "	R.	...	(Deceased).
Mansukh Rai ...	" "	R.	Berar ...	Extra Assist. Conservator.
R. Das Mukerji ...	" "	R.	...	(Resigned).
Maung Shwe Ka ...	" "	R.	Burma ...	Extra Assist. Conservator.
Jai Kishen ...	" "	R.	Panjab ...	Forest Ranger.
Maung Thakado ...	" "	R.	Burma ...	Extra Assist. Conservator.
A. Rahman Sahib...	" "	F.	Madras ...	Forester.
Atma Ram ...	Jan. 4, 1885	R.	Panjab ...	Forest Ranger.
Devi Datta ...	" "	R.	" ...	" "

Name.	Date of Certificate.	Certificate.	Where employed on 1st Jan. 1894.	Rank on 1st Jan. 1894.
C. P. Howell ...	Jan. 4, 1885	R.	Madras ...	Extra Assist. Conservator.
Keshava Nand ...	" "	R.*	N.-W.P. & Oudh	" "
Nand Mal ...	" "	R.	Ajmere ...	Forest Ranger.
C. M. Madura. Pillai	" "	R.	Madras ...	" "
K. Ponnappa ...	" "	R.	Coorg ...	" "
Sundar Das ...	" "	R.	Panjab ...	" "
C. L. Toussaint ...	" "	R.	Burma ...	Deputy Conservator.
Maung Khan Hein	" "	F.	" ...	Myook.
Gour Krishna Sircar	Oct. 30, 1885	F.	Bengal ...	Forest Ranger.
Harswarup (II) ...	" "	F.	N.-W.P. & Oudh	" "
Bagh Singh ...	Jan. 1, 1887	F.	"	Forester.
Mukandi Lal ...	" "	F.	"	Forest Ranger.
Pancham Singh ...	" "	F.	"	" "
Rama Dutt ...	" "	F.	"	" "
Upendra Dutt ...	" "	F.	"	Forester.
E. M. Buchanan ...	Mar. 3, "	R.*	Andamans ...	Extra Assist Conservator.
Ramaswami Ayer ...	" "	R.*	Mysore State ...	Assistant Conservator.
Sita Ramaiya ...	" "	R.*	" ...	" "
V. Narain Appa ...	" "	R.*	...	...
T. Bapú Rao ...	" "	R.	Madras ...	Forest Ranger.
Chintamani Joshi...	" "	R.	...	...
V. C. Doras. Pillai	" "	R.	" ...	" "
Jawala Parshad ...	" "	R.	Panjab ...	Extra Assist. Conservator.
L. A. R. Kershaw...	" "	R.	...	...
S. C. Moss ...	" "	R.	Madras ...	" "
Manbir Gurang ...	" "	R.	Nepal ...	...
Mulraj ...	" "	R.	Baluchistan ...	Forest Ranger.
K. N. S. Aiyar ...	" "	R.	Madras ...	" "
Parmeswari Din ...	" "	R.	N.-W.P. & Oudh	" "
N. M. Rego ...	" "	R.	Madras ...	" "
R. C. Krishna ...	" "	R.	Central Provinces	Extra Assist. Conservator.
Sheo Baksh ...	" "	R.	Jeypore State	...
S. Rai K. Shankar	" "	R.	Baroda State	...
Alamdar Husain ...	" "	F.	...	(Resigned).
Rama Nand ...	" "	F.	Patiala State	...
Harnam Singh ...	Mar. 28, "	F.	Panjab ...	Forest Ranger.
Palekandra Atchiah	July 9, "	R.	Coorg ...	" "
Bhaskar Rao ...	" "	R.	...	...
Beli Ram ...	" "	R.	Panjab ...	" "
Choga Lal ...	" "	R.	Central Provinces	" "
Mangal Sain ...	" "	R.	Panjab ...	" "
A. Eggia-Sastri ...	" "	R.	Madras ...	" "
S. Eggia N. Shastri	" "	F.R.	" ...	" "
M. L. N. Shastri ...	" "	R.	" ...	" "
Jodh Singh ...	" "	F.	N.-W.P. & Oudh	Forester.
Badri Dutt ...	Dec. 15, "	F.	"	"
Gajadhar ...	" "	F.	"	"
Hans Raj ...	" "	F.	...	(Deceased).
Jagbandan Singh ...	" "	F.	Rewa State	...
Madho Ram ...	" "	F.	N.-W.P. & Oudh	Forester.
Manchar Singh ...	" "	F.	"	"
Natha Singh ...	" "	F.	Panjab ...	Forest Ranger.

Name.	Date of Certificate.	Certificate.	Where employed on 1st Jan. 1894.	Rank on 1st Jan. 1894.
Randaman Singh ...	Dec. 15, 1887	F.	Rewa State	...
Sheikh Chand ...	" "	F.	...	(Deceased).
Jot Ram ...	" "	F.	N.-W.P. & Oudh	Forester.
Pirbhú Lal ...	" "	F.	"	Forest Ranger.
A. N. Han. Raò ...	Mar. 19, 1888	R.	Madras ...	" "
Madho Parshad ...	" "	R.	N.-W P. & Oudh	" "
T. Malaya Pillai ...	" "	R.	Madras ...	Forest Ranger.
J. G F. Marshall ...	" "	R.	" ...	Extra Assist. Conservator.
N. Nagarazú ...	" "	R.	" ...	Forest Ranger.
Pandurang Narayen	" "	R	Berar ...	" "
Ram Narayan ...	" "	R.	N.-W.P. & Oudh	" "
A. F. X. Saldanha	" "	R.	Madras ...	" "
Saradindú Goswami	" "	R.	...	...
G. H. Wittenbaker	" 23, "	F.	...	(Left).
N. Bihari Nandi ...	" "	F.	...	(Deceased).
Rastumj ...	" "	F.	...	...
Chajjú Ram ...	July 14, "	R.	Panjab ...	Forest Ranger.
Imam-ud-din ...	" "	R.	" ...	" "
E. E. Slane ...	" "	R.	Bengal ...	Extra Assist. Conservator.
Surappa Iyer ...	" "	R.	...	...
J. Tapp ...	" "	F.	Madras ...	Forest Ranger.
Radha Kishen ...	Dec. 28, "	F.	Jeypore State	...
V. A. Chetty, B A....	Mar. 25, 1889	R *	Madras ...	Extra Assist. Conservator.
Achru Ram ...	" "	R.	Patiála State	...
D. L. K. Calderwood	" "	R.	Burma ...	Extra Assist. Conservator.
S. Eggia N. Shastri	" "	R.	Madras ...	Forest Ranger.
T. N. Hearsey ...	" "	R.	" ...	Extra Assist. Conservator.
J. J. Hobday, B.A....	" "	R.	Central Provinces	" "
Jagat Ram ...	" "	R.	Panjab ...	Forest Ranger.
Kamr-ud-din ...	" "	R.	...	(Deceased).
E. C M. Mascarenhas	" "	R.	Madras ...	Forest Ranger.
W. R. McCay ...	" "	R.	" ...	" "
Nand Lal ...	" "	R.	Panjab ...	" "
Nava Kumar Seth...	" "	R.	...	(Deceased).
R Quinnell ...	" "	R.	Bengal ...	Extra Assist. Conservator.
Raghubans Sahaya	" "	R.	N.-W.P. & Oudh	Forest Ranger.
J. W. Ryan ...	" "	R.	Madras ...	" "
C. Subramania Aiyar	" "	R.	" ...	" "
Akbar Ali ...	" "	F.	N.-W.P. & Oudh	Forester.
Arjún Singh ...	" "	F.	Central Provinces	"
Jodh Singh ...	" "	F.	N.-W.P. & Oudh	"
Kundan Lal ...	" "	F.	Central Provinces	Forest Ranger.
Mukat Bihari Lal ...	" "	F.	"	Forester.
E. J. N. James ...	July 7, "	R	...	(Deceased).
B. Chandra Ghosal	" "	R.	...	"
Parshadi Lal ...	" "	R.	N.-W.P. & Oudh	Forest Ranger.
E. L Haslett ...	" "	R.	"	Extra Assist. Conservator.
Kampta Parshad ..	" "	R.	"	Forest Ranger.
Arokiasawmy Pillai	" "	R.	Madras ...	" "
L. Hanumanthulu	" "	R.	" ...	Forester.
P. R R Pillai ...	" "	R.	" ...	Forest Ranger.
C. H. Haldane ...	" "	R.	Berar ...	Extra Assist. Conservator.

Name.	Date of Certificate.	Certificate	Where employed on 1st Jan. 1894.	Rank on 1st Jan. 1894.
M. Rama Rao ...	Mar. 1890	R *	Madras ...	Forest Ranger.
S. G. Paranjpe, B A.	" "	R.*	Central Provinces	Extra Assist. Conservator.
Gulab Rai ...	" "	R.	N.-W.P. & Oudh	Forest Ranger.
Krishna Nand Joshi	" "	R.	...	(Resigned).
Nawazish Ali ...	" "	R.	Panjab ...	Forest Ranger.
G. W. Thompson...	" "	R.	Madras ...	" "
Faiz Bakhsh ...	" "	R.	Central Provinces	" "
Nilkantha Mukherji	" "	R.	Assam ...	" "
K. Rama Rao ...	" "	R.	Madras ...	" "
A. Tatham ...	" "	R.	Ceylon ...	Forester.
Aruri Ram ...	" "	R.	Panjab ...	Forest Ranger.
Prithvi Singh ...	" "	F.*	Nahan State ...	" "
Telu Ram ...	" "	F.	...	...
Ghulam Haidar ...	" "	F.	...	...
E. B. Powell ...	July 14, "	R.	Burma ...	Extra Assist. Conservator.
Ram Chand ...	" "	F.	Ulwar State ...	Forester.
W. A. Hearsey ...	Dec. 4, "	R.	Burma ...	Extra Assist. Conservator.
U. Nath Kanjilal ...	Apr. 1, 1891	R.*	Assam	Extra Assist. Conservator, Instructor, Forest School.
B. Heera Singh, B A.	" "	R *	Mysore State ...	Forest Probationer.
C. Appaya, B.A ...	" "	R.*	" ...	" "
A. R. Rama Rao ...	" "	R.	Madras ...	" Ranger.
V. K. Aiyar ...	" "	R.	" ...	" "
M. G. R. Rao, B A.	" "	R.	Mysore State ...	" Probationer.
N. C. McLeod ...	" "	R.	Central Provinces	Extra Assist. Conservator.
R F. Lowis ...	" "	R.	Burma ...	" "
H. Srinivása Rao ...	" "	R.	Mysore State ...	Forest Ranger.
M. Srinivása Rao ...	" "	R.	" ...	" "
Srinivasalu Naidu	" "	R.	Berar ...	Extra Assist. Conservator.
P. Mudaliar ...	" "	R	Central Provinces	Forest Ranger.
A. T. C. Howell ...	" "	R.	"	" "
Mehar Chand ...	" "	R.	Panjab ...	Forester.
F. Ryan ...	" "	R.	Burma ...	Proby Extra Assist. Con.
W. G. Gilmore ...	" "	R.	Central Provinces	Forest Ranger.
A. Iyengar ...	" "	R.	Mysore State ...	" "
Inmati Shama Rao	" "	R	Central Provinces	" "
J. P. Haslett ...	" "	R.	"	" "
Jiwa Ram ...	" "	R.	Jubal State	...
Guru Das Chatterji	" "	R.	Bengal ...	" "
N. Murti Rao ...	" "	R.	Mysore State ...	" "
A. Hunt ...	" "	R.	Central Provinces	" "
W. Ferguson ...	" "	R.	Ceylon ...	Forester.
Bhaya Lal Dube ...	" "	F.*	Central Provinces	Forest Ranger.
Jagan Nath ...	" "	F.	Marwar State ...	" "
Jehangiri Lal ..	" "	F.	Kotaha State	...
Dhondo Narayan ...	" "	F.	Central Provinces	Forester.
Pyare Lal ...	" "	F.	Kalsia State	...
Ram Prasada Tiwari	" "	F.	...	(Deceased).
Nand Lal ...	" "	F.	Nalagarh State	...
N. Chandra Datt ...	" "	F.	Central Provinces	Forester.
Ajodhya Prasada ...	Oct. 7, "	F.	Ulwar State ...	"
D. Barrow ...	" 15, "	F.	N.-W.P. & Oudh	"

Name.	Date of Certificate.	Certificate.	Where employed on 1st Jan. 1894	Rank on 1st Jan. 1894.
Rajendra Lal Shawe	Oct 22, 1891	F.	Central Provinces	Forester.
A. L. Chatterjee ...	Apr. 1, 1892	R.	"	Forest Ranger.
G. P. Khattri ...	" "	R.	"	"
R C Thompson ...	" "	R.	"	Extra Assist. Conservator.
P. W. Healy ...	" "	R.	Burma ...	" "
C. W. B. Anderson	" "	R.	" ...	" "
G. V. Sarangpani ...	" "	R.	Baroda State	...
K. A. Naidu ...	" "	R.	Madras ...	Forest Ranger.
L. K. Martin ...	" "	R.	Berar ...	Extra Assist. Conservator.
Moung Charlie ...	" "	R.	Burma ...	Forest Ranger.
Karam Chand ...	" "	R.	Panjab ...	Forester.
Mehdi Hasan ...	" "	R	N -W.P. & Oudh	Forest Ranger.
F. A. Senger ...	" "	R.	Coorg ...	Extra Assist. Conservator.
Krishnama Achari	" "	R.	Madras ...	Forester.
M Kavanagh ...	" "	R.	Burma ...	Extra Assist. Conservator.
Devi Dayal ...	" "	R.	Panjab ...	Forester.
A. H Mee ...	" "	R.	Bengal ...	Extra Assist. Conservator.
F. W. Wightman ...	" "	R	Central Provinces	Forest Ranger.
S. R. Parsons ...	" "	R.	"	" "
A. M. Walker ...	" "	R.	Ceylon ...	Forester.
W H. Blacker ...	" "	R.	Madras ...	Forest Ranger.
R. S. Bower, B A...	" "	F.	" ...	" "
Bhairon Prasada...	" "	F.	Central Provinces	Forester.
Daulat Ram ...	" "	F.	Jodhpur	...
Jaimal Singh ...	" "	F	N.-W P. & Oudh	"
Uttam Singh ...	" "	F	"	"
Nathu Singh ...	" "	F.	"	"
Hafiz-Ullah Khan	" "	F	"	"
C. S. Rogers ...	Apr. 1, 1893	R.	Burma ...	Forest Ranger.
K. G. Mudaliar ...	" "	R.	Madras ...	" "
Dhanjishah Avasia	" "	R.	Central Provinces	" "
H. K. Washikar ...	" "	R.	Kolhapur ...	" "
T. A. Mudaliar ...	" "	R.	Madras ...	Forest Ranger (offg.)
W. B Jackson ...	" "	R.	" ...	Forester.
A. B. Myers ...	" "	R.	" ...	"
S. R. Iyer ...	" "	R.	" ...	Forest Ranger (offg.)
S. K. Chetty ...	" "	R.	" ...	"
P. V. Naidu ...	" "	R.	" ...	Forest Ranger.
K. G. Javadekar ...	" "	R.	Hyderabad	...
P. S. Govinda Rao...	" "	R.	Mysore ...	Forest Ranger.
A. M. Sawyer ...	" "	R.	Travancore ...	" "
Ramnath Mukerji...	" "	R.	Assam ...	" "
C. E. Allen ...	" "	R.	Madras ...	Forester.
H. E Kelly ...	" "	R.	" ...	Forest Ranger.
R F. Colaço ...	" "	R.	Coorg ...	" "
W. J. Lane-Ryan ...	" "	R.	Burma ...	Extra Assist Conservator.
D. H Allan ...	" "	R.	" ...	Forest Ranger.
Kali Charan Varma	" "	R.	N.-W P. & Oudh	" "
G. K Dandawati ...	" "	R.	Hyderabad	...
F. S. Brito ...	" "	R.	Madras ...	Forester.
C. Rajagopal Naidu	" "	R.	" ...	"
V. E. Naidu ...	" "	R.	Coorg ...	Forest Ranger.

Name.	Date of Certificate.	Certificate.	Where employed on 1st Jan. 1894.	Rank on 1st Jan. 1894.
W. G. J. Peake ...	Apr. 1, 1893	R.	Berar ...	Forest Ranger.
R. H. Cole ...	" "	R.	Central Provinces	" "
Bhawani Das ...	" "	R.	Bahawalpur ...	Assistant Forest Officer.
A. P. R. Mudaliar...	" "	R.	Madras ...	Forester.
Gurditta Mal ...	" "	R.	Panjab ...	"
E. J. D. Pierce ...	" "	R.	Madras ...	"
L. V. Naidu ...	" "	R.	"	"
Abdul Haq ...	" "	R.	Panjab ...	"
N. S. Anantacharlu	" "	R.	Madras ...	"
Kanhya Lal ...	" "	R.	N.-W.P. & Oudh	"
Shyam Sundar ...	" "	F.	Jeypore ...	"
Akbar Khan ...	" "	F.	Kashmir ...	In private employ.
Harji Ram	" "	F.	N.-W.P. & Oudh	Forester.
Sundar Lal ...	" "	F.	"	"

LIST OF DIRECTORS OF THE IMPERIAL FOREST SCHOOL SINCE ITS INSTITUTION.

Name	From	To
Capt. (then Major) F. Bailey, R E., ...	Sep. 1, 1878	Oct. 31, 1881
Major G J. VanSomeren, (Offg) ...	Nov. 1, 1881	May 10, 1882
Major F Bailey, R E, ...	May 11, 1882	Feb. 21, 1884
W. R Fisher, Esq, (Offg)	Feb. 22, 1884	Dec. 15, 1884
E E. Fernandez, Esq, (Offg)	Dec. 16, 1884	Mar. 15, 1885
W. R Fisher, Esq., (Offg)	Mar. 16, 1885	Jan. 1, 1889
E E Fernandez, Esq, (Offg)	Jan. 2, 1889	Jan. 15, 1889
Lieut -Colonel F. Bailey, R E., ...	Jan. 16, 1889	June 10, 1889
E E. Fernandez, Esq, (Offg)	June 11, 1889	Aug. 22, 1889
Lieut -Colonel F Bailey, R E, ...	Aug 23, 1889	
Colonel G J VanSomeren, (Offg) ...	Aug 24, 1889	Nov. 23, 1889
Lieut -Colonel F Bailey, R E, ...	Nov. 24, 1889	Mar. 23, 1890
C Bagshawe, Esq., ...	Mar. 24, 1890	Oct. 13, 1890
J. S. Gamble, Esq, ...	Oct. 14, 1890	Nov. 3, 1893
A. E Wild, Esq, (Offg)	Nov. 4, 1893	

PROGRAMME OF HILL TOUR OF 1893.

The Class will come in from Karwapani to Dehra on or about March 25th as the Instructors may order From March 25 to April 9 they will remain in Dehra to get ready for tour and perhaps do some practical work at the Forest School or at Kaunli. They will then proceed independently to Chakrata, where roll will be called at the Divisional Forest Office at Morrow's Neck at 8 A. M on April 12th. The following is the probable list of movements after that, but the programme may be liable to some alterations as there is much snow on the hills.

April	12—16.	At Chakrata. Visits to the Korwa, Lurli, Suitoli, Forest Garden and Matkangra Blocks, lectures on the Forest and Forest trees of the Jaunsar Division, on Systematic Botany and on the Working Plans of Jaunsar.
„	17.	Chakrata to Jadi.
„	18	Jadi to Bodyar.
„	19—25.	At Bodyar. Study of deodar reproduction, natural and artificial; practical work in cleanings and thinnings and visits to important localities.
„	26	Bodyar to Kotikanasar.
„	27.	At Kotikanasar. Thinnings of Kail over deodar and study of forest works in Kophti, Asmari and adjoining Blocks.
„	28.	Kotikanasar to Konain.
„	29.	At Konain.
„	30	Sunday.
May	1, 2.	Monthly Examinations and work at Konain.
„	3—5.	At Konain.
„	6.	Konain to Mundali.
„	7—10.	At Mundali. Study of mixed hill forests, deodar, firs, the girdling of firs over deodar, planting and nursery works.
„	11.	Mundali to Kathian.
„	12—16.	At Kathian. Resin tapping works, road-making, blasting, thinning of blue pine, &c.
„	17.	Kathian to Thadyar: roads and bridges: botany.
„	18.	Thadyar to Deota. Sledge road and sleeper shoot. Chir forests and their reproduction.
„	19—23.	At Deota. Exploitation of deodar forests. Cutting and extraction of sleepers. Old sledge road. New sledge road works at Bamsu.
„	24.	Deota to Thadyar.
„	25.	Thadyar to Kathian.
„	26.	Kathian to Mundali.
„	27.	Mundali to Deoban.

May 28—31. At Deoban. Oak forests, plantations, also monthly Examinations

June 1. Vacation commences.

Letters for the camp should be addressed "Forest School Camp *viâ* Chakrata."

2. As far as Chakrata, students will make their own arrangements for carriage. Beyond Chakrata, the carriage employed will be either mules or coolies. As carriage in the hills is both expensive and limited in quantity, each student will leave Dehra with no more equipment or luggage than is absolutely necessary, but he should take care that he has sufficient warm clothing and bedding. The Deputy Director and Instructors will arrange to inspect kit once before the students leave Dehra and again at Chakrata. As few servants as possible should be taken, and their number reported to the Deputy Director before starting Should any student desire to do so, he can leave any articles that, after starting, he may find to be unnecessary at the Forest Chauki at Chakrata in charge of the Depôt Munshi The student will write out a list in duplicate of all such articles, sign both and obtain the signature of the Munshi to both. The student and the Munshi will each retain one copy of the list as a voucher.

3. Unless the Deputy Director in charge should otherwise arrange, coolies will be paid by the student employing them at the end of each day's march. To prevent mistakes, each cooly, before taking up his load, will be given, as a voucher, a slip of paper bearing on its face the date of the march and the name of the owner of the load; and each voucher must be redeemed by payment in full daily.

4. When mules are employed, each mule owner will be given slips showing the date of the march and the name of the owner or owners of the load These vouchers must be redeemed at times fixed by the Officer in charge of the Camp. Students are not allowed to choose their coolies or mules, but must take those apportioned to them by the Forest Ranger or by their Instructors.

5. No student will be allowed to take any horse or pony beyond Chakrata. Dogs may not be taken at all.

6. As the close season for game birds will be on when the camp is in the hills, no shooting of such birds may be allowed. Shooting of other game will only be allowed on special permission of the Deputy Director on holidays.

7. No student is to run into debt with villagers anywhere. Payment in full must be made daily for articles bought from Forest Subordinates or from the Forest Department banias. Students are personally responsible for their servant's debts.

8. The orders of the Deputy Director and Instructor in charge of the camp must be strictly attended to in all particulars, including

sanitary regulations, laying out of the camp, discipline, leave of absence, &c.

9. At 10-30 P.M. all lights must be put out, unless specially sanctioned, on each occasion, by the Officer in charge. After 10-30 P.M. silence must be kept in camp.

10. The following bugle calls will be sounded in camp. The hours will be fixed by the Officer in charge from time to time :—

(1). First bugle;
(2). Warning bugle, half an hour before class or excursion;
(3). Fall in bugle;
(4). Break off bugle.

11. No camp will be moved on Sundays, except for very special reasons, and no student will be required to do any work on a Sunday. On Sunday, for Protestant Christian students, Divine Service will be held as usual should any be present. A quarter of an hour before the time fixed on, the bugle will sound.

12. Each student will provide himself with :—

1. Measuring tape.
2 2-foot rule
3. A pair of plant collecting boards, drying paper and newspaper to pack specimens in.
4. Handsaw.
5. Pruning knife.

He is recommended to carry a sling bag with the necessary articles and his note books

13. Before starting from Dehra, the Deputy Director will inspect note books, collecting boards, &c., in order to see that the students are fully and properly provided.

PROGRAMME OF TOUR FOR THE SENIOR CLASS.

November to March. 1893-94:

Senior Students both classes in charge of Deputy Director till December 21st, 1893 and in February, 1894; and of Instructor C. G. Rogers, Esq., during January, 1894.

November 1. March to Lachiwala and remain there till the 20th December. In the mornings from 7-30 to 9 A.M., there will be lectures or private study, as the Deputy Director may order At 11 A M. the students will be employed in out-of-door practical work, the details of which will be notified to them from time to time by the Deputy Director.

I. The principal work will be to prepare a working plan for the Lachiwala Coppice, the chief items in this operation consisting of :—

1. Making enumeration surveys to ascertain the stock.
2. Selecting and marking the standards.
3. Description of compartments.
4. Actually felling a portion of the current year's coupe.

Besides this, other work at Lachiwala will embrace :—

II. Charcoal burning.
III. All work connected with improvement fellings in the Sal forest.
IV. Planting out Chir pine and other trees in baskets.
V. Sowing in all its branches.
VI. Preparation of various fibres, &c.

These works will occupy the students till the 21st December, when the Christmas holidays will commence.

January 5. Reach Lahore.
" 6. Roll call at 8 A.M. at Conservator's Office. Visit Shadera plantation in afternoon, assembling at the point fixed at 11 A M.
" 7. Sunday.
" 8. Shadera plantation, assemble at 11 A M.
" 9. Lahore to Changa Manga. (European students will go to the Serai; others will camp near the Forest House).
" 10—15. At Changa Manga. Study the plantation, working-plan, tramway, outside rakhs, &c.

January	16.	Leave Changa Manga at 1 P.M. (Bombay Mail).
„	18.	Arrive Ajmere 8 A.M.
„	19—22.	See Ajmere forests.
„	23.	Leave Ajmere at 1-17 A.M. Arrive Saharanpur at 7-54 P.M.
„	24.	Visit Saharanpur Botanic Gardens.
„	25.	Arrive Hardwar 5-5 P.M.
„	26.	Halt at Hardwar. Visit Ranipur Coppice and Bamboo plantation.
„	27.	Hardwar to Parduni. Visit Ganges Canal Head works on the way.
„	28.	Sunday.
„	29.	Bamboo thinnings and plantation.
„	30.	Parduni to Kansrao. See evergreen forest on the way.
„	31.	Kansrao to Lachiwala. See Sissoo forest and reproduction on the way.
February	1.	Lachiwala to Thano. See Sample plot on the way.
„	2.	Give out Surveying instruments and allot areas.
Feb. 3—Mar. 4.		Survey examination and revision of work in preparation for final examinations.
March	5.	Or thereabouts. Thano to Dehra.

PROGRAMME OF TOUR FOR THE JUNIOR UPPER CLASS.

WINTER TERM 1893-94.

In charge of Instructor A. F. Gradon, Esq.

November	1.	March to Karwapani.
„	2.	„ Kallianpur.
„	3—December 21.	At Kallianpur. The students will employ their time chiefly in practical surveying. In the morning there will be lectures in Sylviculture, illustrated, when necessary, in excursions to the neighbouring forests.
December	22—January 4, 1894.	Christmas Holidays.
January	5.	Roll call at Dehra Dún at the School at 8 A. M.
„	8.	Roll call at Dakhpathar at 7 A. M., afterwards Inspection of Boom and Depôt.
„	9.	Inspection of Boom and Timber Depôt.
„	10.	Visit to the Kalsi coppice near Dakhpathar.
„	11.	March to Dharmawala.
„	12.	Visit to the Shahpur and Badripur forest blocks.
„	13.	March to Badshahibagh.
„	14.	Sunday, halt.
„	15.	Visit to the Badshahibagh coppicé areas.
„	16	March to Barkala
„	17.	March to Kasumri through the forest by Barkala and Kasumri Raus.
„	18.	Shahjahanpur.
„	19.	Mohand.
„	20.	Visit to the Mohand coppice areas.
„	21.	Sunday, halt.
„	22.	March to Dholkhand.
„	23.	Visit to the Sample plots, improvement felling areas.
„	24	March to Beribara.
„	25.	Visit to the Beribara coppice.
„	26	March to Ranipur.
„	27—February 6.	Practical work at Ranipur, coppicing bamboo thinnings &c., and examinations.
February	7.	March to Parduni.
„	8.	At Parduni, bamboo works.
„	9.	„ Nichla Suswa coppice and other works.
„	11.	Sunday, halt.
„	12.	March to Kansrao.
„	13.	„ Lachiwala.
„	14.	Visit to the various works in forests near Phandowala.

February 15. March to Phandowala.
" 16. " Asarori. See Ramgarh plantation.
" 17. " Karwapani.
" 18—March 30. At Karwapani. Practical instruction in Forest Engineering and Forestry.
March 31. March to Dehra.

The junior lower class will go to Lachiwala with the Deputy Director, during November and December, and then join the junior upper class in Dehra Dún and continue with it.

BOOKS AND INSTRUMENTS REQUIRED BY STUDENTS.

1. Students who join the Imperial Forest School for the English class will be expected to provide themselves with the following books and Instruments at once. They can be obtained from the School Store-keeper:—

1 Todhunter's Trigonometry.
1 „ Algebra.
1 „ Mensuration.
1 Barnard Smith's Arithmetic.
1 Hamblin Smith's Statics.
1 Tables of Logarithms.
1 Roorkee Surveying Manual.
1 Fernandez's Smaller Forestry Manual (when published fully).
5 Primers of Botany, Physical Geography, Geology, Chemistry and Physics.
1 Smythies' list of Dún Trees, &c.
1 Magnifying glass.
1 Small pair botanical pincers.
1 2-foot measuring rule.
1 6-foot nickel case tape.
1 Small box mathematical instruments containing compasses, bow-pen and protractor.
1 Architects' Rule.
2 Set Squares 45° and 60°.
1 Card protractor.
1 Dozen drawing pins.
3 Brushes of sizes.
4 Pencils 1 H. H., 1 H., 2 H. B.
1 Piece India rubber.
1 Piece Indian ink.
6 Drawing nibs with holder.
10 Cakes colours, green, vermillion, sienna, cobalt, gamboge, yellow ochre, carmine, Prussian blue, neutral tint, sepia.
1 Colour slab.
6 Field books (when ready).
6 Lecture and surveying note books.
A small supply of stationery including pens.

The cost of these is expected to come to about Rs. 50, which will be adjusted out of the allowance for the purpose given to each Student.

2 The Store-keeper, Babu Bírbal, Forest Ranger, is prohibited from issuing any articles from store to anybody except—

(1) On payment in full;
(2) On written order of the Director.

Students requiring articles from store must therefore either pay for them in cash or obtain from the Director an order on the Storekeeper.

3. The following articles will be supplied by the School on loan, on the students' receipt, at such times as they may be required and will be returned to store when no longer required:—

For Survey work	Drawing Board. Prismatic Compass and stand. Plane-table and stand. Chain and arrows. Level and staff. Flags. Offset rods. Pentagraph. Planimeter and any others that may be required.
For Forest and other work	Diameter gauges. Tree-measurers. 1 pair plant collecting boards with sufficient paper (will usually be retained during whole term of studies).

4. Books of reference may be consulted in the Library or Herbarium, but will not be permitted on any account to be removed from those rooms. The following books will be lent when required:—

Forest Department Codes.
Forest Acts and other Acts required for the Law Course.

5. All articles lent to students must be signed for previous to issue, and the student will be responsible for loss or damage to them, the amount payable for such loss or damage to be assessed by the Director or any School Officer authorized by him.

6. The apparatus, specimens, maps, &c., used in lecture or placed in the Museum are the property of the Government and must on no account be removed from the School premises. Any infraction of this order will be severely punished.

ENTRANCE EXAMINATION, 1893.

I.—English.

(*Time allowed*, 3 *hours*).

A.—COMPOSITION.

1.—Write, in the first person, a short letter to a friend explaining your opinions on the choice of a career and why you wish to become a candidate for Forest service.

2.—Rewrite, in simple prose, one of the following:—

(1) They came, they cut away my tallest pines,
My dark tall pines, that plumed the craggy ledge
High over the blue gorge . . . . . from beneath
Whose thick mysterious boughs in the dark morn
The panther's roar came muffled.

(2) Straight mine eye hath caught new pleasures
Whilst the landscape round it measures;
Russet lawns and fallows gray,
Where the nibbling flocks do stray;
Mountains, on whose barren breast
The labouring clouds do often rest;
Meadows trim with daisies pied,
Shallow brooks and rivers wide.

3.—Distinguish between

(*a*) Transitive and intransitive verbs;
(*b*) Active voice and passive voice;
(*c*) Indicative mood and subjunctive mood;

giving one or two examples of each.

4.—Give the parts of speech of the words in the following sentence:—'He went to the railway-station, and having purchased a ticket, took his seat in the train.'

Shew how the sentence might be altered so as to avoid using the participle.

5.—Write a short essay on one of the following subjects:—

(1) The advantages of a scientific compared with a literary education.

(2) The field crops and trees of any District in India with which you are personally acquainted.

[*Note*—*Correct language, expression and spelling are of more consequence than mere length of writing*].

B.—CONVERSATION.

The candidate must, in a conversation, extending over at least a quarter of an hour, satisfy the officer conducting the examination that he possesses a fluent and accurate colloquial knowledge of English. In order further to test his ability to understand spoken English, he will be required to write in his own words, in his vernacular (Hindustani, Bengali, Tamil, English, &c., as the case may be) the substance of a communication made to him verbally in English, such as an order to a Forest Subordinate. (A certificate to the effect that the candidate has satisfied both these tests must accompany his written answers to the previous question).

II.—Arithmetic.

(Time allowed, $2\frac{1}{2}$ hours.)

1. Find the value of $\dfrac{(3\frac{2}{5} + \frac{8}{45}) \div (16\frac{1}{8} \times \frac{10}{7})}{\frac{28}{5} \text{ of } \frac{20}{7} \text{ of } 26\frac{1}{4}}$ of Rs. 17 as. 8 p. 9.

2. Reduce 85 acres 3 roods 915 square yards 4·5 square feet to the decimal of an acre; and find the value of $(4{\cdot}17 \times 2{\cdot}03 \times 105{\cdot}165) \div 5{\cdot}03$ correct to 5 decimal places.

3. A contractor undertakes to complete a piece of work in 80 days He puts on 100 men, 50 women, and 25 boys, and after work has proceeded for 12 days, rain stops work for a week. Assuming that one man does as much work in a day as two women or three boys, find out how many extra boys, *or* women, *or* men, the contractor must put on when work is resumed after the rain, in order to complete his work by the required time.

4. A man, who has Rs. 15,425 invested in one hundred rupee shares of an Indian bank, sells out at 103, and remits the amount to England when exchange is at 1 sh. $2\frac{25}{32}$ d. the rupee. He invests the amount in Consols at $97\frac{1}{2}$, and receives $2\frac{3}{4}$ per cent. What will his income be?

5. Find the amount of £125 in 3 years at 4 p.c. compound interest; and the present value of Rs. 5000 due 3 months hence at 8 p.c. per annum.

6. A cistern can be filled with water by a pipe in 15 hours, and can be emptied by an exhaust pipe in $24\frac{1}{2}$ hours. Both pipes are turned on at once, and after 30 hours the exhaust pipe is closed. When will the cistern be full?

7. Find the G.C.M. of 480, 720, and 2880; and the L.C.M. of 15, 42 and 45.

8. Find the value, by Practice, of 9 tons 15 cwt. 3 qrs. 17 lbs. of seed at Rs. 465 as. 14 p 3 per ton.

III.—Algebra.

(*Time allowed*, $2\frac{1}{2}$ *hours*).

1. Simplify

$$(p+q+r+s)^2+(p-q-r-s)^2+(p-q+r-s)^2+(p+q-r-s)^2$$

and find its value when $p=1$, $q=-2$, $r=-3$, $s=4$.

2. Find the greatest common measure of

$$x^3-9x^2+26x-24, \quad x^3-10x^2+31x-30,$$

and

$$x^3-11x^2+38x-40.$$

3. Simplify

$$\cfrac{1}{x+\cfrac{1}{1+\cfrac{x+1}{3-x}}}$$

4. Solve the following equations:—

(*a*). $$\frac{1}{y}-\frac{1}{x}=\frac{1}{xy} \quad . \quad . \quad . \quad \text{(i)}$$

$$\frac{3}{y}-\frac{4}{x}=\frac{18}{xy} \quad . \quad . \quad . \quad \text{(ii)}$$

(*b*). $$\frac{3}{x-3}+\frac{4}{x+2}=\frac{3}{2(x-5)}$$

5. Extract the square root of

$$9a+24a^{\frac{5}{6}}b^{\frac{1}{6}}-12a^{\frac{1}{3}}b^{\frac{1}{3}}+16a^{\frac{2}{3}}b^{\frac{1}{3}}-16a^{\frac{1}{3}}b^{\frac{2}{3}}+4b,$$

and rationalize $$\frac{3}{2-\sqrt{3}}+\frac{13}{4-\sqrt{3}}-\frac{6}{3-\sqrt{3}}$$

6. The net revenue realized, per acre per annum, of a forest, is three quarters of the gross revenue received. If the net revenue were increased by 50 per cent., and the gross revenue were decreased by 25 per cent., they would be equal. Find the gross and net revenues per acre per annum of the forest.

(*N.B.*—*Net* revenue = *gross* revenue − expenditure).

7. An area is planted with Sâl and Sain transplants, the number of Sâl transplants originally put out was 3 times as large as that of

the Sain transplants. One-third of the Sâl and one-quarter of the Sain transplants died, and the vacancies were filled in with Tûn. One-half of the Tûn transplants died during the year. The empty pits were counted and found to be 2,500. Find the original number of Sâl, Sain and Tûn transplants put out into the plantation.

IV.—Geometry.

(*Time allowed*, 2½ *hours*).

1. What are axioms? Define, an acute angled triangle, a figure, the centre of a circle, a gnomon, an angle in a segment of a circle, parallel straight lines, the altitude of a figure.

2. Draw a straight line through a given point parallel to a given straight line.

Find a point B in a given straight line CD, such that if AB be drawn to B from a given point A, the angle ABC will be equal to a given angle.

3. In an acute angled triangle the square on the side subtending an acute angle, is less than the squares on the sides containing that angle, by twice the rectangle contained by either of these sides, and the straight line intercepted between the perpendicular let fall on it from the opposite angle and the acute angle.

4. The angles in the same segment of a circle are equal to one another.

ABCD is a quadrilateral figure inscribed in a circle, and the sides AB, CD when produced meet at O: shew that the triangles AOC, BOD are equiangular.

5. If the three points be joined in which the circle inscribed in a triangle meets the sides, show that the resulting triangle is acute angled.

6. In a right angled triangle, if a perpendicular be drawn from the right angle to the base, the triangles on each side of it are similar to the whole triangle and to each other.

Give the corollary to this proposition.

V.—Mensuration.

(*Time allowed*, 2½ *hours*).

1. Two men buy 1000 yards of wire netting each and enclose two fields. One man makes his field in the form of a square; the

other, in that of a rectangle the adjacent sides of which are in the proportion of 2 to 3. What rent will each man receive for his field at Rs. 5 an acre?

2. A log of wood is 40 feet long, and tapers uniformly from 84 inches girth at the large end to 66 inches at the smaller end. Find the cubic contents of the log and its value at Rs. 1/8/0 per cubic foot. ($\pi = \frac{22}{7}$).

3. Find the cost of white-washing a room, 20 feet long, 16 feet wide, and 14 feet high, allowing for two doors 7 feet by 4 feet, and two windows 5 feet by $3\frac{1}{2}$ feet, at 8 annas per 100 superficial feet. If the walls are two feet thick, calculate the cubic contents of the masonry.

4. If the room in the last question is covered with a roof, having a pitch in which the length of the rafters is three-fourths of the breadth of the building, find the area of the roof, and its cost at Rs. 4 per 100 superficial feet.

5. A box with a lid is made of planks $\frac{3}{4}$ths inch thick, and the exterior measurements are 26 inches long, 15 inches wide, and 12 inches high; find how many lbs. of tea this box will contain, if one cubic foot of tea weighs $1\frac{1}{4}$ lbs.

6. Find out how many plants are required to stock a plantation of 115 acres, the plants being put out in lines 9 feet apart, and the distance between the individual plants in each line being one yard.

7. A solid ring of brass, circular in section, contains 1200 cubic inches, the thickness of the ring being 2 inches. Find the internal diameter of the ring. ($\pi = \frac{22}{7}$).

FINAL EXAMINATIONS, MARCH 1893.

Forestry. (Mr. A. Smythies).

Paper No. I. SYLVICULTURE.

1. What is the difference between a *deciduous* and an *evergreen* tree? Under which head would you place, Mango, Sál, Sandal, Red Sanders, Teak, Chir pine, Toon, Sissoo, Deodar, Blue pine, Jaman, Karshu oak, Mallotus, Banyan, and the male Bamboo?

Which of the above species are *indigenous* in the Forests of the Dehra Dún and Saharanpore Divisions?

2. What are the principal advantages of growing mixed, as compared with pure, crops? Give three examples of each kind that you have seen since July, 1891.

3. Of the various methods of treating or exploiting forests, explain which you would employ in each of the following cases, giving briefly your reasons:—(1) Fir forest in Jaunsar. (2) Mixed scrub forest in Saharanpore. (3) A pure Sissoo forest in the Eastern Dún. (4) Mixed teak forest in Burma.

4. Explain why improvement fellings are considered to be applicable over a large portion of our Indian forests, and describe quite generally in what they consist.

5. Explain fully what is meant by a 'cleaning' and shew how you would adapt it to (1) a young Sál crop in the Dún, (2) a mixed crop of Deodar and Blue pine in Jaunsar.

6. Describe briefly the ordinary method of preserving a forest from fire.

7. Describe briefly any results you may have noticed (1) of continued preservation of the same area from fire during a series of years, and (2) of constant burning.

8. What are the principal considerations which would influence you in deciding upon the site of a nursery, and under what conditions would you transplant into nursery lines?

9. Describe the method of sowing in patches.

10. Describe the method of basket planting.

Forestry. (Mr. A. Smythies).

Paper No. II. UTILIZATION AND WORKING PLANS.

1. What do you know about durability as a technical property of wood? How would you apply what you know regarding durability

to any ordinary case of fencing round a Forest Ranger's house? Mention three of the most durable woods in India.

2. What are the qualities of wood required for railway sleepers, and what are the principal Indian woods used in this industry?

3. Describe the cross-cut saw, and the purposes for which it may be used. What is the M tooth?

4. How should a tree be felled with the axe alone, if you wish the tree to fall in some particular direction?

5. Describe briefly the wholesale disposal of the trees of a coupe standing.

6 Describe the distillation of crude resin, and state for what purposes the products yielded are used.

7. What are working plans and why are they required? What do you understand by stock map, provisional plan, and exploitable age?

8. Enumerate the different methods of determining the number of trees in a crop, and state what circumstances would influence you in choosing a method in any particular case.

9. What are the various methods of determining the exploitable age of trees? Which method would you employ in a forest where no fellings had ever taken place?

Drawing, Surveying and Estimating. (Mr. C. G. Rogers).

1. What is a scale? How is the field work of survey affected by the scale to which the map is plotted?

Construct a scale of 9·65 chains to 10·24 inches to show single links, giving all the necessary calculations. Figure the scale correctly, and mark off on it the following lengths:—6 chains 5 links, and 9 chains 73 links.

2. Enumerate the different methods by which an area on a map can be taken out. How should the planimeter be set, if it is to be used to take out an area which is represented on a map by a few square inches? Explain how the planimeter is used to take out any area.

3. ABCDE is a pentagonal figure, the lengths and bearings of four of its sides are as follows:—

AB length 2 inches, bearing 130°
BC length 3 inches, bearing 75°
CD length 2½ inches, bearing 346°
DE length 4 inches, bearing 280°

Find the length and bearing of the line EA.

4. Write up an imaginary level field book for two lines AB, BC, given the following information. The line from A to B falls the whole way, at first slightly and then abruptly. The line from B to C rises all the way, at first suddenly and then slightly. Three intermediate readings are taken on each line. Make up and prove your field book.

5. Describe briefly the use of the plane-table in filling in the interior detail of a survey. How may the plane-table be set up in the field?

6. The aggregate length of the walls of a building is 52 feet. The walls are all 14 feet high and 2 bricks thick. Estimate the number of bricks (9″ × 4″ × 2½″) required for the construction of the wall, neglecting the thickness of the mortar joints.

Forest Engineering. (Mr. C. G. Rogers).

1. What are the chief constituents of brick earth, and how does each affect its quality, so far as its suitability for making bricks is concerned? What earths are unsuitable for brick making?

2. Enumerate the chief uses of lime in building construction, giving the composition of each of the materials enumerated.

Describe the process of making concrete.

3. Explain fully the meaning of the following sentence:—
"Galvanized corrugated sheet iron, 24 B.W.G."

Describe one method of fixing corrugated iron sheets on to a roof truss.

4. State briefly how you would prepare an estimate for a Range house. What are working drawings? What is their use?

5. What is rafting? How does it differ from floating? How would you proceed to render a stream fit for floating timber?

6. Describe with sketches the construction of a simple trussed-beam bridge, explaining the use of its component parts.

7. State briefly how you would proceed to demarcate an area which has been duly gazetted as a Reserved forest.

What is a boundary record, how should it be kept up and what is its use?

Mathematics. (Mr. A Smythies).

1. A cooly's wages in one province are 3 annas a day, and in another province 5 annas a day, but in the latter province the cooly does $1\frac{3}{4}$ times as much work in the day as the man in the former province; compare the cost of doing a piece of work in the two places.

2. A forest crop, which contains 5,000 cubic feet, is found at the end of a year to contain 5,125 cubic feet, and at the end of the second year, 5,250 cubic feet, and so on. Find the contents of the crop at the end of the 30th year.

3. A man bought a forest for Rs. 20,000, and at the end of 20 years sold it for Rs. 33,250. It had cost him Rs. 60 a year to protect it all this time. Find what interest (simple) he received for his outlay.

4. Given log 3 = 0·477121, and log 5 = 0·698970 find the logarithms of 225, $\frac{27}{25}$, and 33·75.

5. I observe the elevation of the top of a tower from a point due south of it on the same horizontal plane as its base, to be 60°, and after proceeding due west for 200 feet, I observe the elevation to be 45°. Determine the height of the tower.

6. A base AB is measured on a plain and is found to be 3 miles 1,510 yards in length. There is a distant point C such that the angle CAB = 57° 21′, and the angle CBA = 62° 18′. Find the length of CA, given the following logarithms:—

log 6·790	= 0·831870
L sin 62° 18′	= 9·947136
L sin 60° 21′	= 9 939052
log 6·917	= 0·839918
log 6·918.	= 0·839981.

7. In an experiment to ascertain the relation between stacked cubic feet and solid cubic feet, it is found that 10,000 stacked cubic feet weigh 130 tons 15 cwt. 50 lbs. It is known that the solid cubic foot of that kind of wood weighs 55 lbs. Find the ratio between stacked and solid cubic feet.

8. Explain clearly how you would proceed to find the reducing factor for timber in a given species and forest.

9. Shew that the instrument for directing the fall of a tree, known as the "forest devil," is a lever of the first and second class alternately at each stroke, but that the power is the same in either case.

Natural Science, No. I. (Mr. A. F. Gradon).

1. Explain what is meant by Chemical Action, Combining Weight, Element, Compound, Alloy, Oxidation, Combustion, giving examples in each case. Also show how the indestructibility of matter may be illustrated in the burning of a candle.

2. What is an acid? How is hydrochloric acid prepared and what are its chief properties?

3. What are the chief properties of Potassium? Mention some of its more important compounds. State to what class of elements it belongs and give the chief characteristics of the class.

4. What is the relation between the volume of a gas and the pressure to which it is exposed? Describe an experiment showing how a given volume of gas at the ordinary pressure of the atmosphere would behave if the pressure were reduced by one half.

5. What are the properties of a liquid? Which of these properties is made use of in the Bramah Press, and how?

6. How are winds caused? Explain Land and Sea Breezes, Trade Winds.

7. Show why it is reasonable to suppose the interior of the earth to be cooling while the surface remains at more or less the same temperature, and explain the connection between such an unequal cooling and those gradual movements of upheaval and depression known to be taking place in different parts of the world.

Natural Science, No. II. (Mr. A. F. Gradon).

1. What do you understand by a Trap Rock? Into what two groups may these be divided and by what signs might it be ascertained to which group a given trap rock belongs.

2. Explain the causes of stratification and state what are the chief means of distinguishing the relative ages of stratified rocks.

3. What do you understand by a Mineral? Give the composition and chief characters of Quartz, Mica, Kaolin, Limonite, Calcite.

4. Where and in what forms during the School tours have you seen Sandstone, Conglomerate, Dolomite, Trap, Gneiss, Quartzite? Give the composition of these rocks and say to which class each belongs.

5. Describe the process of the formation of a soil, giving the agencies to which such formation is due, and explain to what extent and how the composition and quality of a soil depends on the composition of the original rock out of which it has been formed.

6. For the purposes of Sylviculture how may soils be classified? What are the chief ingredients of a soil, how may each be recognized and separated from the others?

7. What are the chief physical properties of a soil?

Botany I. (Mr. J. F. Duthie and Mr. A. F. Gradon).

MORPHOLOGY, CLASSIFICATION AND GEOGRAPHY.

1. Define the following terms:—Inflorescence, Æstivation, Vernation, Placentation and describe the chief forms of the latter.

2. What is a fruit? What do you understand by a simple fruit, an aggregate fruit, a dehiscent fruit and an indehiscent fruit? Give three examples of each of the two last and define 'Capsule' and 'Cone.'

3. What are the accessory organs of a plant? Mention and describe some of the more important of such organs.

4. What is meant by the Natural system of classifying plants? On what principles was the Linnean system based?

5. Give some of the chief distinguishing characters of Dipterocarpeæ, Meliaceæ, Rubiaceæ, Urticaceæ, and Coniferæ.

6. To what natural orders do the following trees belong:—Bassia latifolia, Teak, Phœnix sylvestris, Bauhinia retusa, Æsculus indica, Walnut, Sandalwood, Cordia myxa, Eucalyptus and Rhododendron.

7. Give the chief distinguishing characters of Papilionaceæ, Cæsalpinieæ, and Mimoseæ, and mention any forest trees you know of belonging to these sub-orders.

8. Give a general outline of the distribution of the different classes of forests in India and their relation to the rainfall.

Botany II. (Mr. A. F. Gradon).

ANATOMY, PHYSIOLOGY, AND WOUNDS AND DISEASES.

1. Describe, giving sketches (*a*) a cell in the earlier stage of its development (*b*) a well developed living cell. Describe also the different constituents of the latter.

2 Describe the structure of a leaf of the bi-facial type Give a sketch of a section taken through such a leaf to illustrate your answer.

3. What do you understand by Metabolism, Reserve Materials, Products of degradation (Give an example of such a product). Under ordinary conditions would the amount of starch in a cell be greater when a plant is in the light, or in the dark?

4. What do you know of the respiration of a plant, and what is the result of respiration as regards the temperature of a plant?

5. Describe the healing up of wounds in woody parts. Give two sketches to illustrate your answer, showing in section, a stem from which a branch has just been removed and the same two years later with the wound partially healed.

6. Exclusive of the withdrawal of plant substance what other effects may parasites produce in the host plant? Distinguish between Parasites and Saprophytes, and state what is the importance of the distinction as regards nutrition.

Zoology. (Mr. E. C. Cotes).

1. Give the distinguishing characters of the group to which the coral polyp belongs, and explain how so simple an animal is able to build up so complicated a structure as coral.

2. Compare the breathing organs of a fresh water crab, a silk worm, and a frog, from what you remember of your dissection of these creatures.

3. How would you classify the following animals:—Leech, bel, animalcule, mulberry silkworm, centipede, scorpion, snail, toad, cobral white ant, ant lion, tiger beetle, bamboo beetle, ichneumon fly, mosquito, toon twig borer, Indian trout, crocodile, camel, porcupine, badger.

4. If a freshly killed oval-headed snake were brought to you, how would you examine it to ascertain whether it belonged to a poisonous species?

5. Give as shortly as you can, the main points in the habits of the following insects: white cockchafer grub of nurseries and coffee estates, longicorn borer found in Jáman trees at Lachiwala last November, tusser silk insect, palm weevil, saw fly.

6. How would you prepare a skull for preservation in a museum collection?

Forest Law. (Mr. N. Hearle).

1. What is the meaning of legal possession?

A land-owner who claims a corner of a Government Reserved Forest sells 20 Sál trees from the disputed area to a contractor. The

purchaser begins felling and exporting the timber. What action should be taken by the Forest Officer in charge? If the land-owner wished to enforce his claim, what would be his proper course of action? The purchaser having paid for the trees, how should he recover his money?

2. About four acres of land on a private estate are required for a timber depôt. Explain the steps that should be taken to obtain the land. What sections of the different Forest Acts deal with such questions?

How does the Forest Act provide for the acquisition of certain land within the limits of an area which it is proposed to constitute a reserved forest, when the Forest Settlement Officer has admitted a right in such land?

3. Give a brief account of the Rules which have been made in different Provinces for the management of forests other than Reserved Forests.

4. Explain why special Forest Laws are required.

5. Give an account of the legal methods by which the transit of timber or other forest produce by water may be regulated?

6. Define "an attempt to commit an offence." What is the usual punishment, and can attempts to commit offences of whatever kind be prosecuted?

7. Give the forms of punishment, or what are practically punishments, which are peculiar to the Forest Act.

8. Explain the organisation of the Forest Service of India, with especial reference to the Provincial Forest Service.

Accounts and Procedure. (Babu Kasheshwar Mookerjee).

1. Name the principal books that are required to be kept by a tradesman keeping his accounts by the system known as "Book keeping by single entry" and the purpose for which each book is kept. Explain the terms "Crossed Cheque," "Cash Recovery of Service Payments," "Refunds," and illustrate each by an example.

2. Name the Authority whose sanction is required to each of the following works in the Forest Division:—

(a). Purchase of a tent at a cost of Rs. 170.
(b). Rent of a piece of land for a Forest Chauki for one year at Rs. 3 per year.
(c). Compensation to a cultivator for damage done to his crops by Departmental timber works, Rs. 50.
(d). Doctor's fee for the treatment of the Divisional elephant, Rs. 100.
(e). Expenses of witness summoned by Divisional Officer in a Forest case, Rs 5.
(f). Refund of Revenue amounting to Rs. 25.

3. Write out a Cash Book, with the following entries, filling in sub-heads of charge and other information that may be required, also Make Book Transfer Entries, remittances to Treasury, &c., where occasion arises:

			Rs	As.	P.
1st Feb. 1893.		Cheque No. 14 on Dehra Dún Treasury of date ...	800	0	0
	,,	Part pay of Sub-Forest Establishment for Jan. 1893 ...	530	0	0
	,,	,, of Office Establishment for ,, ...	160	0	0
	,,	Arrears of Pay of Naziruddin, Forest Guard, for December 1892	6	0	0
	,,	Arrears of Pay of Káli Ram, Chaprasi, for Dec. 1893...	7	0	0
	,,	Amount of Income-Tax recovered from A. B, Forest Ranger, on his pay for Jan. 1893, by deduction from his pay bill	2	8	0
	,,	Amount overdrawn by A. B., Forest Ranger, in his T. A. bill for October, 1892, now refunded, *vide* item No. 10 for November 1892	3	2	0
4th	,,	Cheque No 15 on Dehra Dún Treasury	400	0	0
	,,	Sale proceeds of lease of hides and horns in the Ramgarh range from Fakira	60	0	0
6th	,,	Paid by transfer to the Mathematical Instrument Department, Calcutta, as per Bill No. 70, dated 12th February 1893 (acceptance No. 40 of date) for 2 prismatic compasses supplied	60	0	0
	,,	Mungul Singh for cutting and carriage to Parduni Forest Depôt of 120 scores of 12' bamboos at 4 annas per score	30	0	0
	,,	Advertising in the 'Mafasilite' the sale of drift timber at the Lalta Rau Depôt	5	0	0
8th	,,	Marking areas in compartment 5 of the Lachiwála coppice for removal of timber &c., by purchasers, 20 coolies at 3 annas each	3	12	0
	,,	Wages of a Forest Guard watching the export of timber removed by privilege holders from the Chandrabani Forests during January 1893	6	0	0
10th	,,	Balance pay of Sub-Forest Establishment for Jan. 1893	112	0	0
15th	,,	Paid for 4 hunting knives for Forest Rangers' uniforms at Rs. 10 each	40	0	0
	,,	Wages of a Surveyor and 2 Khalasis employed to assist the Superintendent of the Dún, during the settlement of the Malkot Forests	20	0	0
	,,	Laying out and cleaning travellers' camping ground in Kansrau closed forests, 24 coolies at 3 annas each ...	4	8	0
	,,	Pruning trees in the Lachiwála camping ground; 4 coolies at 3 annas each	0	12	0
20th	,,	Collecting *débris* and clearing compartment 4 of the Mohamedpur block after completion of Syed Hossain Contractor's work, 50 coolies at 3 annas each ...	9	6	0
22nd	,,	Collection and despatch of exhibits for the Chicago Exhibition	5	0	0
24th	,,	Carriage of a box of Stationery from Calcutta ...	4	8	0
	,,	Cheque No. 16 on Dehra Dún Treasury (cancelled) ...	250	0	0
26th	,,	Purchase of 2 bound books of Country paper for Mothonwála Chauki	2	0	0
	,,	Carriage of Divisional Dák during December 1892 ...	14	0	0
	,,	Sale proceeds of fishing contract in the Suswa river for 1892-93	60	0	0

		Rs.	As.	P.
26th Feb. 1893.	Security deposit of Mohamed Buksh, contractor, forfeited	50	0	0
"	Balance salary of Office Establishment for Feb. 1893	40	0	0
"	Account of Forest Ranger Ramgarh Range for Jan. 1893 (in 8 vouchers) being in recovery in full of item No. 10 of December 1892 Rs. 120 and in part of item No. 12 of January 1893 Rs. 60 8 0 ...	180	8	0

Then close the Cash Book, balancing it properly and neatly.

4. Prepare a daily labour bill for the following items for the preparation of the Ramgarh Chauki during December 1892:—

1 Mason, 20 days at Rs. 15 per month,
1 " 22 " " 12 "
1 " 16 " " 10 "
1 Carpenter 10 " " 15 "
1 " 12 " " 12 "
50 Coolies at 3 annas each,
22 " at 2 " 6 pie each,
6,000 Kutcha bricks at Rs. 1-4 per 1,000,
3,000 Pulas thatching grass at Rs. 5 per 1,000,
2 Maunds of ban-rope at Rs. 1-8 per maund,
5 Seers of iron nails at Rs. 2-8 per maund,
20 Seers coal-tar at Rs. 15 per maund.

5. The following timber was salved from the Ganges during October 1892:—

40 Chir sleepers,
20 " logs,
30 " karis,
25 Deodar karis,
7 " logs,
30 Sál tors,
400 Cubic feet of fire-wood,

of which 15 Chir sleepers, 16 Chir logs, 20 Deodar karis and 30 Sál tors were made over to claimants and the balance transferred to Government account. 20 Chir sleepers, 4 Chir logs, 5 Deodar logs and 200 cubic feet of firewood were sold by auction at Rs. 15, 12, 25 and 30 respectively. Prepare the necessary timber returns in Forms 7, 8, 9.

6. Describe briefly the procedure to be observed on the transfer of charge of a Range Office.